IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

FRACTUS, S.A.	§	
	§	
Plaintiff,	§	
	§	
	§	
v.	§	**Civil Action No. 2:22-cv-413**
	§	
VIVINT, INC.	§	**JURY TRIAL DEMANDED**
	§	
Defendant.	§	
	§	
	§	
	§	
	§	
	§	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Fractus, S.A. ("Fractus" or "Plaintiff") hereby submits this Complaint for patent infringement against Defendant Vivint, Inc. ("Vivint" or "Defendant").

THE PARTIES

1. Fractus, S.A. is a foreign corporation duly organized and existing under the laws of Spain with its principal place of business in Barcelona, Spain.

2. Fractus is the owner by assignment of all right, title, and interest in U.S. Patent No. 7,907,092, No. 8,738,103, No. 8,994,604, No. 10,135,138, No. 10,468,770, and No. 11,349,200 (collectively, the "Patents-in-Suit").

3. On information and belief, Defendant is a corporation organized under the laws of the State of Utah with its principal place of business at 4931 North 300 West, Provo, Utah 84604. Defendant has a registered agent for service of process in Texas at CT Corporation System, 1999 Bryan Street, Suite 900, Dallas, Texas 75201-3136.

JURISDICTION AND VENUE

4. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1, *et seq.* This Court has jurisdiction over this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

5. This Court has personal jurisdiction over Defendant. Fractus is informed and believes, and on that basis alleges, that Defendant conducts business and has committed acts of patent infringement and/or has induced acts of patent infringement by others in the State of Texas and within this judicial district. Defendant regularly transacts business in the State of Texas and within this District. Defendant has purposefully directed infringing activities at residents of the State of Texas, and this litigation results from those infringing activities. Defendant regularly sells (either directly or indirectly), its products within this district. For example, Defendant has placed and continue to place infringing products into the stream of commerce via an established distribution channel with the knowledge or understanding that such products are being and will continue to be sold in this Judicial District and the State of Texas. Defendant is subject to this Court's specific and/or general personal jurisdiction pursuant to due process and/or the Texas Long Arm Statute, Tex. Civ. Prac. & Rem. Code § 17.042, due at least to their substantial and pervasive business in this State and judicial district, including at least part of their infringing activities alleged herein and deriving substantial revenue from goods sold to Texas residents.

6. Venue is proper for Defendant in this federal district pursuant to 28 U.S.C. §§ 1391(b), (c), and 1400(b). Defendant offers products and services and conducts business in the Eastern District of Texas. *See Wireless Communications Mobile, LLC v. Vivint, Inc.*, No. 6:19-cv-00163-JCB-JDL Dkt. 16, ¶ 11 (August 9, 2022 E.D. Tex.) ("Vivint admits it offers products and services and conducts business in the United States, the State of Texas, and the Eastern District of Texas."). Vivint's website describes areas within this District, for example Tyler and McKinney,

Texas, as within its "Service Area," and offers "24/7 Monitoring," "Custom System[s]," and "Professional Installation," within this area. *See* "Home Security Systems Tyler, Texas," https://www.vivint.com/locations/texas/tyler [https://perma.cc/E6PH-DQK9] (last accessed: 10/10/2022); "Home Security Systems McKinney, Texas," https://www.vivint.com/locations/texas/mckinney [https://perma.cc/2U2P-TQ3Q] (last accessed: 10/10/2022).

7. To conduct its business in the District, Defendant employs a number of individuals within this District. Upon information and belief, Vivint's "business specifically depend[s] on employees being physically present at places in the district, and it [is] undisputable that [Vivint] affirmatively acted to make permanent operations within [this] district to service its customers." *In re Cray Inc.*, 871 F.3d 1355, 1365–66 (Fed. Cir. 2017) (citing *In re Cordis Corp.*, 769 F.2d 733, 736 (Fed. Cir. 1985)). At least through these employees, Vivint "does its business in [this] district through a permanent and continuous presence." *In re Cordis Corp.*, 769 F.2d 733, 737 (Fed. Cir. 1985). For example, Vivint's website notes that "Vivint Pros are available for professional installation for Tyler [Texas] residents, so you can enjoy the safety and security of this unbelievable smart home system right away." *See* "Home Security Systems Tyler, Texas," https://www.vivint.com/locations/texas/tyler [https://perma.cc/E6PH-DQK9] (last accessed: 10/10/2022). Vivint's "Careers" website also lists numerous jobs available in this district, including positions in Plano and McKinney, Texas as "Field Service Technician[s]." *See* "Field Service Technician," https://vivint.wd5.myworkdayjobs.com/vivintjobs/job/Plano-TX/Field-Service-Technician_R119277 [https://perma.cc/URA8-GEAB] (Plano, TX) (last accessed: 10/10/2022); "Field Service Technician," https://vivint.wd5.myworkdayjobs.com/vivintjobs/job/Mckinney-TX/Field-Service-Technician_R119392 [https://perma.cc/ECJ8-JVEF] (McKinney, TX) (last

accessed: 10/10/2022).

8. On information and belief, Defendant also has at least one regular and established place of business in this District in the physical building at 1115 W Hickory Street #105, Denton, TX 7620 (depicted below).

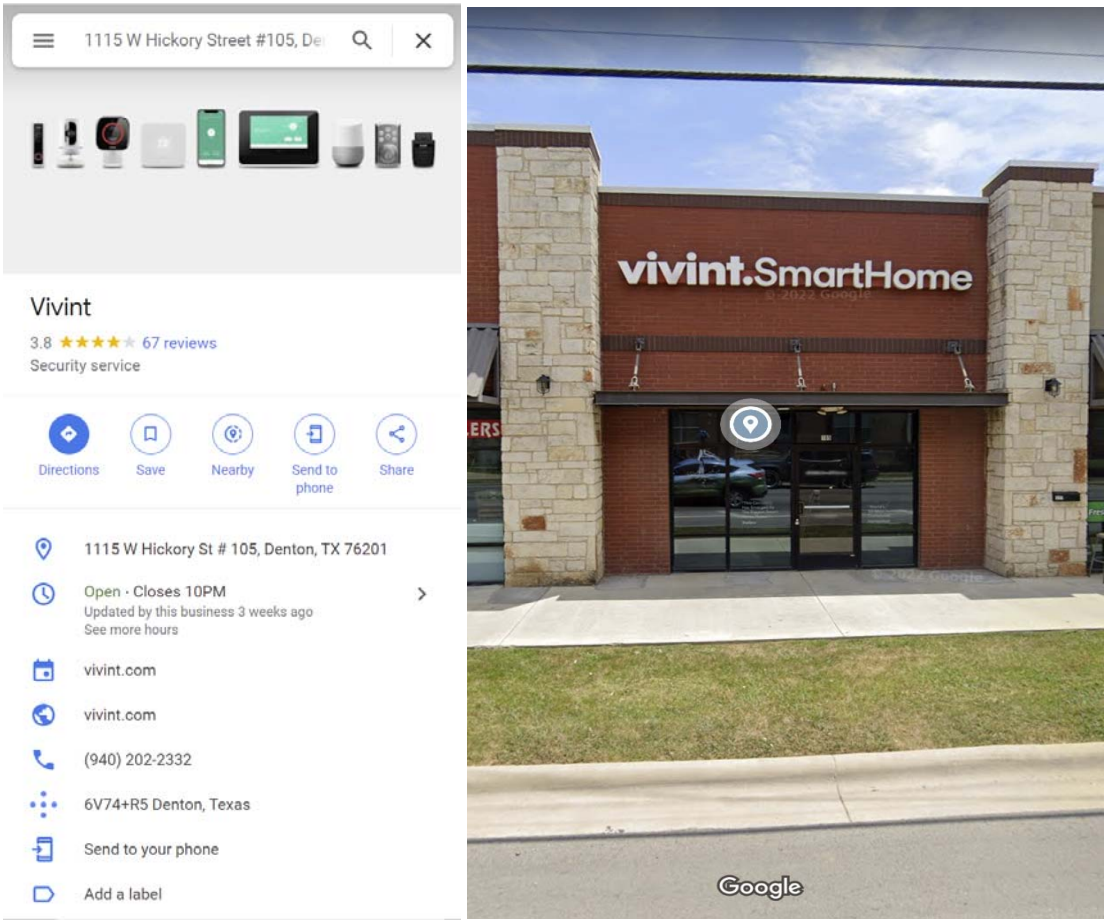


Fig. 1 (source left: https://www.google.com/maps/place/Vivint/@33.2145196,-97.145092,19z/data=!3m1!4b1!4m12!1m6!3m5!1s0x864dca66450f6dd9:0xac14670de07e598d!2sSushi+Cafe+%26+Bar!8m2!3d33.214429!4d-97.1447356!3m4!1s0x864dca664fea2e4f:0x7854e1644cda649a!8m2!3d33.2145301!4d-97.1445475 [https://perma.cc/P2U7-Y5GC?type=image] (last accessed: 10/10/2022); source right: https://www.google.com/maps/@33.2146219,-97.1445091,3a,75y,185.26h,86.66t/data=!3m6!1e1!3m4!1sfL0w7qf1zoD4zYIFG7v-UQ!2e0!7i16384!8i8192 [https://perma.cc/JK3L-ZG6P?type=image] (last accessed: 10/10/2022))

9. According to Denton County property tax records, Defendant owns 100% of this office and pays property taxes for this location. *See In re Cray Inc.*, 871 F.3d 1355, 1360 (Fed. Cir.

2017).

MICHELLE FRENCH
DENTON COUNTY TAX ASSESSOR/COLLECTOR
P O BOX 90223
DENTON, TX 76202
(940) 349-3500

Duplicate Receipt

Property Account Number:
749593DEN

Statement Date: 10/6/22
Owner: VIVINT SMART HOME
Mailing Address: 4931 N 300 W
Provo UT 84604

Property Location: 0001115 W HICKORY ST
Acres: 0
Legal: PERSONAL PROPERTY - OFFICE LOCATION:
1115 W HICKORY ST STE 105
DENTON

Exemptions:
Receipt #: 40587320 Deposit #: 202202179631-2021/Web

YEAR	TAXING ENTITIES	TAXABLE VALUE	TAX RATE PER $100	DATE PAID	BASE TAX PAID	PENALTY & INTEREST PAID
2021	CITY OF DENTON	$13,000.00	0.565823	2/17/22	$73.56	$5.15
2021	DENTON ISD	$13,000.00	1.362000	2/17/22	$177.06	$12.39
2021	DENTON COUNTY	$13,000.00	0.233086	2/17/22	$30.30	$2.12

BASE TAX	**$280.92**
PENALTY & INTEREST	**$19.66**
RENDITION PENALTY	**$30.06**
TOTAL PAID	**$330.64**

Remitted By: Vivint Inc
4931 N 300 W
Provo UT 84604

Payment Type: CHECK
Check #: 100237840630

Remaining Amount Due As of 10/6/22
303.57

Fig. 2 (source: https://taxweb.dentoncounty.gov/Receipt/749593DEN/16148627 [https://perma.cc/3EZ7-XV5U] (last accessed: 10/10/2022))

Click on a title bar to expand or collapse the information.

Property

Account

Property ID:	749593	Legal Description:	PERSONAL PROPERTY - OFFICE LOCATION: 1115 W HICKORY ST STE 105, DENTON
Geographic ID:		Zoning:	
Type:	Personal	Agent Code:	
Property Use Code:			
Property Use Description:			

Location

Address:	1115 W HICKORY ST 105 DENTON, TX	Mapsco:	
Neighborhood:		Map ID:	
Neighborhood CD:			

Owner

Name:	VIVINT SMART HOME	Owner ID:	1016631
Mailing Address:	ATTN; TAX DEPT 4931 N 300 W PROVO, UT 84604	% Ownership:	100.0000000000%

Fig. 3 (source: https://propaccess.trueautomation.com/clientdb/Property.aspx?cid=19&prop_id=749593 [https://perma.cc/9SJ6-UJX8] (last accessed: 10/10/2022))

10. On information and belief, from and within this District, Defendant has committed

and continues to commit acts of infringement in this District.

FACTUAL ALLEGATIONS

Fractus Technology

11. Fractus is a company specializing in advanced antenna technologies based in Barcelona, Spain. Fractus was founded by two college friends, Ruben Bonet and Carles Puente. Dr. Puente, a Professor at the Universitat Politècnica de Catalunya, is the lead inventor on the Patents-in-Suit. Dr. Puente's early research work focused on fractal antennas and evolved over time into the widely applicable and flexible antenna designs that appear in and are covered by the Patents-in-Suit.

12. The Patents-in-Suit were filed as a result of novel research by Fractus into antenna design for wireless devices. Designers of wireless devices often face a number of challenges related to internal antennas capable of enabling efficient multiband operation. As with all antennas, these components both radiate and respond to electromagnetic waves. In the cramped confines of wireless devices, electromagnetic waves given off or absorbed by neighboring components in close proximity to an antenna can significantly impair the antenna's performance and efficiency. Without careful design, these problems may degrade an antenna's electromagnetic performance to the point that the device ceases to function in its intended manner or may require the designer to compromise on other desirable device attributes, such as size. The Patents-in-Suit solve these problems through a variety of novel solutions enabling multiband operation and small size without the efficiency impairments normally faced by these antennas.

13. Fractus has designed antennas for and/or has licensed the right to use its technology to leading companies across a variety of industries, including HTC, LG, RIM, Motorola, Samsung, Asus, ZTE, and CommScope. Since its incorporation Fractus has cumulatively sold more than 40 million antennas to customers. Among the numerous awards and honors the company has received

for its innovative work, Fractus won the 2004 Frost & Sullivan Award for technological innovation, was named a 2005 Davos World Economic Forum Technology Pioneer and one of Red Herring's top innovative companies for 2006. Fractus inventors were finalist for the EPO European Inventor Award in 2014 and in April 2017 Fractus received the "European Inspiring Company Award" by the London Stock Exchange and the Elite Group. In October 2017, Fractus was selected by the European Patent Office (EPO) as an example of IP strategist for small and medium-sized enterprises. In 2021, Fractus endowed a chair at Pompeu Fabra University in Spain, to enhance technology transfer and research into 6G wireless communications. And most recently, in September 2022, Fractus and the Polytechnic University of Catalonia partnered in the creation of a research and technology hub to develop "deep tech" solutions for global challenges.

Vivint's Infringing Products

14. Vivint makes, uses, sells, offers for sale and / or imports Infringing Products in the United States, including, but not limited to, the Vivint Smart Hub Panel (CP04) and the Vivint Car Guard (SD6200).

15. The above list is not exhaustive. Fractus's investigation of Vivint's Infringing Products is ongoing, and the above list will expand as warranted to include additional Infringing Products with similarly designed antennas.

16. The Patents-in-Suit generally relate to the design and construction of antennas capable of receiving and transmitting in the multiple frequencies necessary for communication across cellular and wireless networks. The Patents-in-Suit solve a variety of novel and difficult problems related to the design of such antennas, including those related to the antennas' optimal operating frequencies, optimal radiation / reception patterns, the minimization of undesired radiation from neighboring elements, efficient operation, and satisfaction of size constraints. The

Patents-in-Suit achieve these solutions through creative application of advanced antenna principles developed by Fractus.

Notice and Willfulness

17. Fractus first noticed Vivint via two letters in June of 2021. The letters informed Vivint that Fractus believed Vivint was infringing Fractus's patents. The letters provided a full list of Fractus's patent portfolio, and specifically identified certain Fractus patents—including two of the Patents-in-Suit—which, e.g., the Vivint Smart Hub Panel infringed upon. One letter was sent to Mr. Shawn Lindquist, then-Chief Legal Officer of Vivint, Inc., and the other letter was addressed to Mr. Lindquist and sent "c/o" to Vivint's agent The Corporation Trust Company. Though Fractus received delivery confirmation that Vivint and its agent had received these letters, Vivint made no attempt to contact Fractus to discuss infringement or licensing.

18. Fractus further noticed Vivint via two more letters in February of 2022, both also remaining unanswered at the time of this complaint: the first letter was sent to Mr. Garner Meads, current Chief Legal Officer and Secretary of Vivint, Inc., and the second letter was addressed to Mr. Meads and sent again "c/o" to Vivint's agent The Corporation Trust Company. Those second letters were a follow-up of the first letters sent in June of 2021, and indicated that Fractus had identified additional infringing products and additional patents and claims owned by Fractus that Vivint was infringing, and offered Vivint the opportunity to engage in discussions. Though Fractus also received delivery confirmation that Vivint and its agent had received these letters, Vivint made no attempt to contact Fractus to discuss infringement or licensing.

19. Upon information and belief, prior to this lawsuit Vivint never disputed the validity of the Patents-in-Suit. In particular, Vivint has never communicated any allegedly invalidating prior art to Fractus or attempted to bring any post-grant action at the United States Patent and Trademark

Office.

20. Vivint's conduct has demonstrated a pattern of bad-faith actions in continuing to infringe upon the Patents-in-Suit despite being on notice that it was infringing Fractus's patents. Instead of duly obtaining authorization or a license to practice the Patents-in-Suit and as shown below, Vivint has continued making, using, selling, offering for sale, and / or importing into the United States products that infringed the Patents-in-Suit.

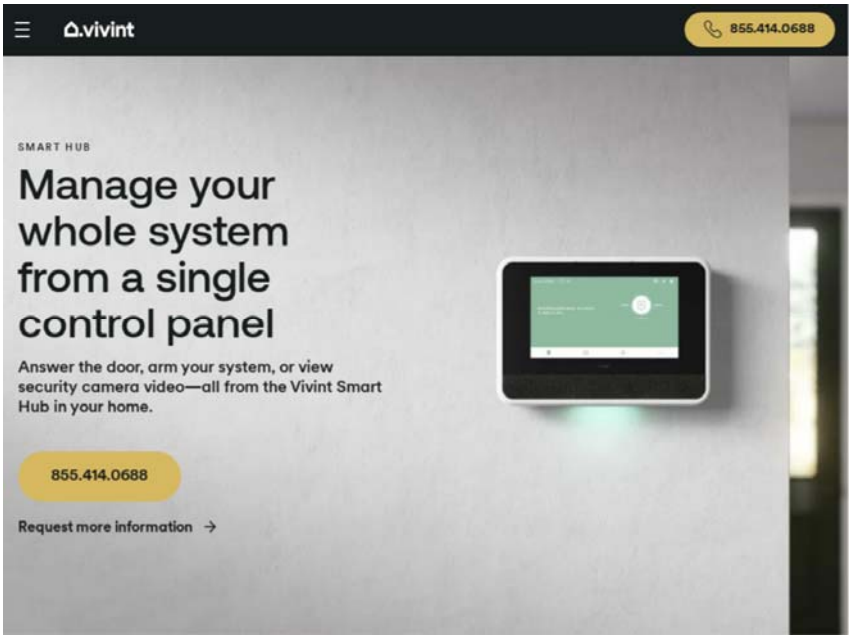


Fig. 4 (source: https://www.vivint.com/products/smart-hub [https://perma.cc/22NA-MTVE?type=image] (last accessed 10/10/2022))

21. Vivint's repeated failure to respond to any notice letter and continued sale of the infringing product(s) identified in these letters evinces a deliberate lack of intention to solve the matter amicably. Vivint has either reviewed Fractus's letters regarding infringement, concluded Vivint needed a license, and yet proceeded to sell infringing products regardless of that determination or, in spite of the repeated notice letters, has failed to make a good faith effort to evaluate the Patents-in-Suit or even discuss the matter with Fractus and thus willfully blinding itself

to the need to obtain a license to practice the Patents-in-Suit.

INFRINGEMENT OF U.S. PATENT NO. 7,907,092

22. On March 15, 2011, United States Patent No. 7,907,092 (the " '092 Patent") was duly and legally issued for an invention entitled "Antenna With One or More Holes." A true and correct copy of the '092 Patent is attached as Exhibit 1.

23. The '092 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '092 Patent expired on July 15, 2022.

24. The '092 Patent describes antennas in which a conductive radiating element includes one or more holes that permit the antenna to exhibit multiband behavior. The features described in the '092 Patent, in particular the addition of holes in the radiating element, enable the antenna to feature multiband behavior in a reduced size.

25. As one example, claim 1 of the '092 Patent recites:

a. A wireless device comprising:

i. A radiating element, the radiating element comprising:

1. A conducting body including a hole;

2. An input terminal;

ii. A ground plane, the ground plane operating in cooperation with the radiating element;

iii. A dielectric support, wherein the radiating element is arranged on the dielectric support;

iv. A feeding means, the feeding means being coupled to the input terminal;

v. Wherein the radiating element defines an external perimeter;

vi. Wherein the hole has an area of at least 20% of an area included inside the external perimeter;

vii. Wherein the external perimeter of the radiating element is shaped as a first polygonal shape comprising at least four sides;

viii. Wherein a perimeter of the hole is shaped as a second polygonal shape comprising a plurality of sides;

ix. Wherein the first polygonal shape and the second polygonal shape are not similar;

x. Wherein the radiating element is shorter than a quarter of a longest operating wavelength of the wireless device; and

xi. Wherein the wireless device is operative at multiple frequency bands.

26. Defendant has directly infringed at least claim 1 of the '092 Patent in violation of 35 U.S.C. § 271(a) by its manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to certain alarm systems, alarm system components and/or aftermarket car telematics with internal antennas. As detailed below, the Infringing Products meet every element of the relevant claims of the '092 Patent literally or under the doctrine of equivalents.[1]

27. As an example, the Vivint Smart Hub Panel satisfies all claim limitations of at least claim 1 of the '092 Patent.

a. The device is a wireless device which possesses a radiating element comprising a conducting body including a hole and an input terminal, as well as a feeding means coupled to the input terminal and a ground plane which operates in cooperation with the radiating element which, in turn, is arranged on the dielectric support.

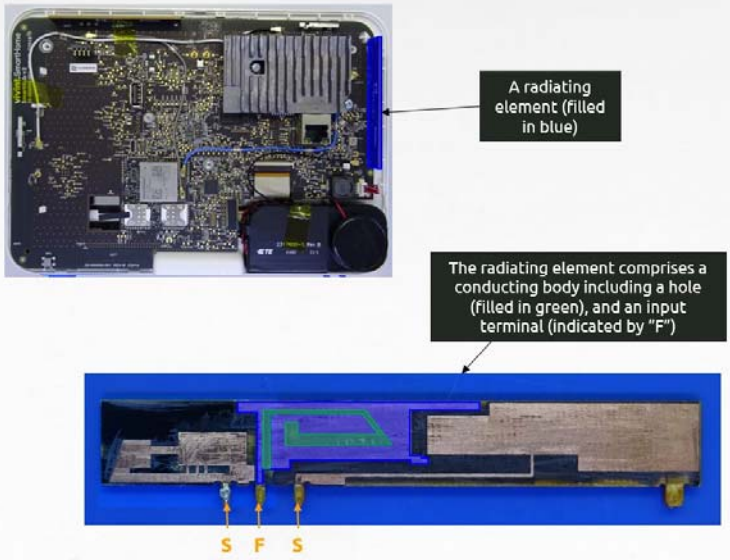
[1] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the '092 Patent.

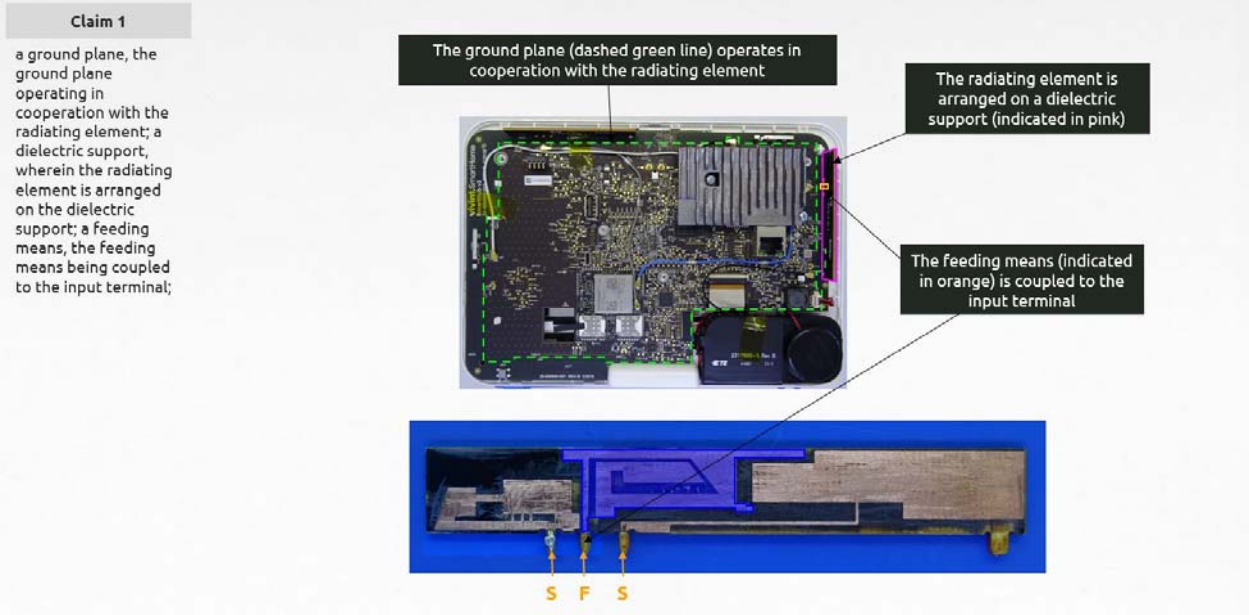
Claim 1

A wireless device comprising:

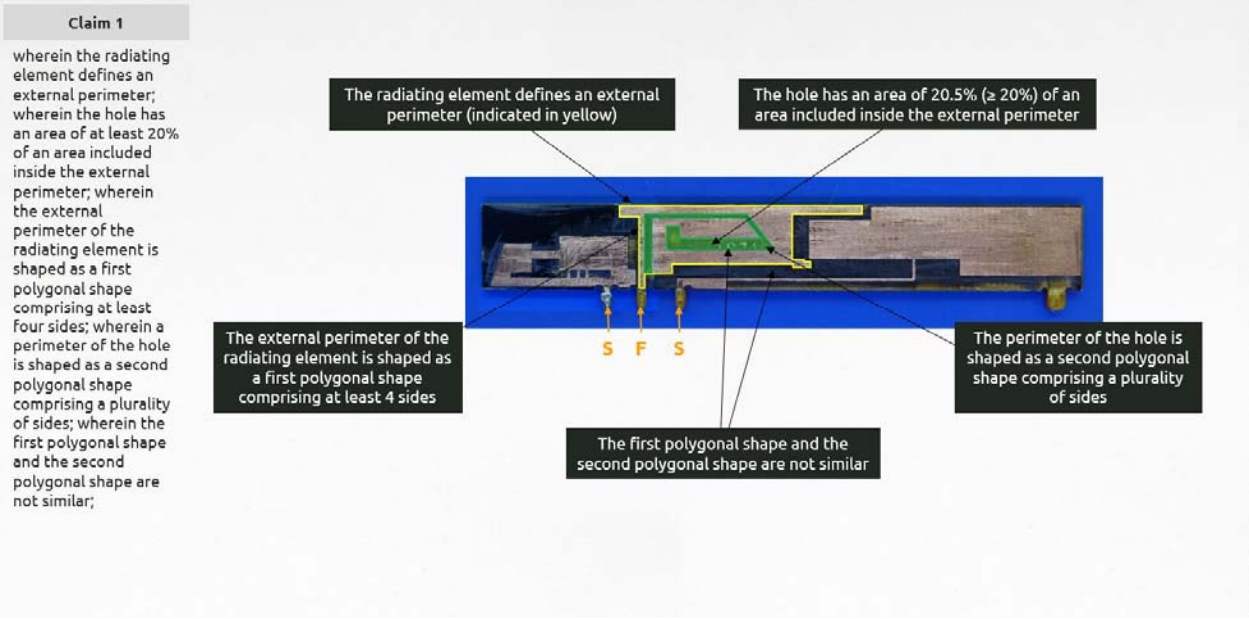
Claim 1

a radiating element, the radiating element comprising: a conducting body including a hole; an input terminal;

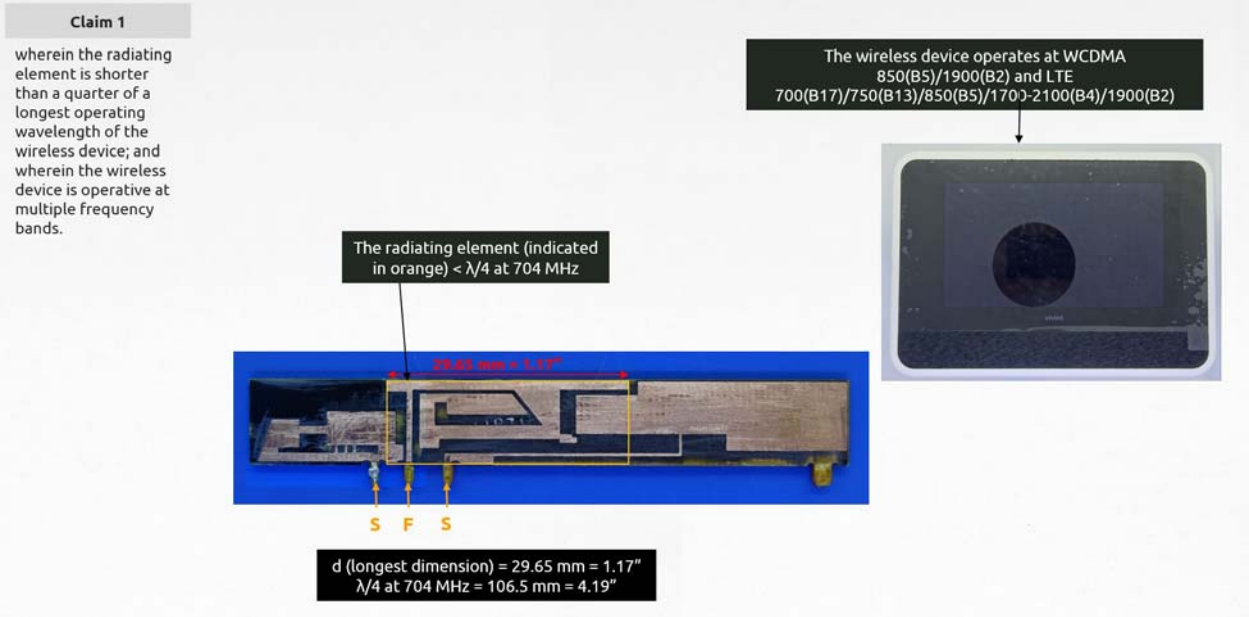




b. The radiating element of this antenna defines an external perimeter with at least four sides with at least one hole which is not the same polygonal shape as that defined by the external perimeter, which has a plurality of sides, and which has an area of at least 20% of the area included inside the antenna's external perimeter.



c. The radiating element is shorter than a quarter of a longest operating wavelength of the wireless device and enables operation at multiple frequency bands.



28. Defendant has knowledge of the '092 Patent and has also indirectly infringed at least claim 1 of the '092 Patent by active inducement under 35 U.S.C. § 271(b). Defendant has induced, caused, urged, encouraged, aided and abetted their direct and indirect customers to make, use, sell, offer for sale and/or import Infringing Products. Defendant has done so by acts including but not limited to selling Infringing Products to their customer; marketing Infringing Products; and providing instructions, technical support, and direct links to vendor websites (available via, e.g., https://shop.vivint.com/?ca=981748 [https://perma.cc/9RT7-BTNU?type=image] (last accessed 10/10/2022)) for the use of Infringing Products. Such conduct by Defendant was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

29. The acts of infringement by Defendant have caused damage to Fractus, and Fractus is entitled to recover from Defendant the damages sustained by Fractus as a result of Defendant's wrongful acts in an amount subject to proof at trial.

INFRINGEMENT OF U.S. PATENT NO. 8,738,103

30. On May 27, 2014, United States Patent No. 8,738,103 (the " '103 Patent") was duly

and legally issued for an invention entitled "Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices." A true and correct copy of the '103 Patent is attached as Exhibit 2.

31. The '103 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code.

32. The '103 Patent generally describes the design of internal antennas for multifunction wireless devices. The antennas described by the '103 Patent resolve a number of problems related to design of efficient antennas for operation in these size-constrained devices including, among other issues, problems related to antenna-device integration arising from the presence of additional electronic subsystems and/or antennas.

33. For example, claim 12 of the '103 Patent recites:

a. A handheld multifunction wireless device having at least one of multimedia functionality and smartphone functionality, the handheld multifunction wireless device comprising:

i. A touch screen;

ii. A processing module;

iii. A memory module;

iv. A communication module;

v. A power management module;

vi. An antenna system within the handheld multifunction wireless device and comprising:

1. A ground plane layer;

2. A first antenna element configured to simultaneously support radiation

modes for first, second, and third frequency bands, the first frequency band being contained within a first frequency region of an electromagnetic spectrum, the second frequency band being contained within a second frequency region of the electromagnetic spectrum that is higher in frequency than the first frequency region, the third frequency band of operation being used by a 4G communication standard, wherein

a. A perimeter of the first antenna element defines a first antenna contour comprising at least thirty-five segments,

b. The first antenna element defining an antenna box, an orthogonal projection of the antenna box along a normal to a face with a largest area of the antenna box defining an antenna rectangle, wherein a length of the first antenna contour is greater than four times a diagonal of the antenna rectangle; and

3. A second antenna element configured to operate in at least one frequency band used by a 4G communication standard, wherein

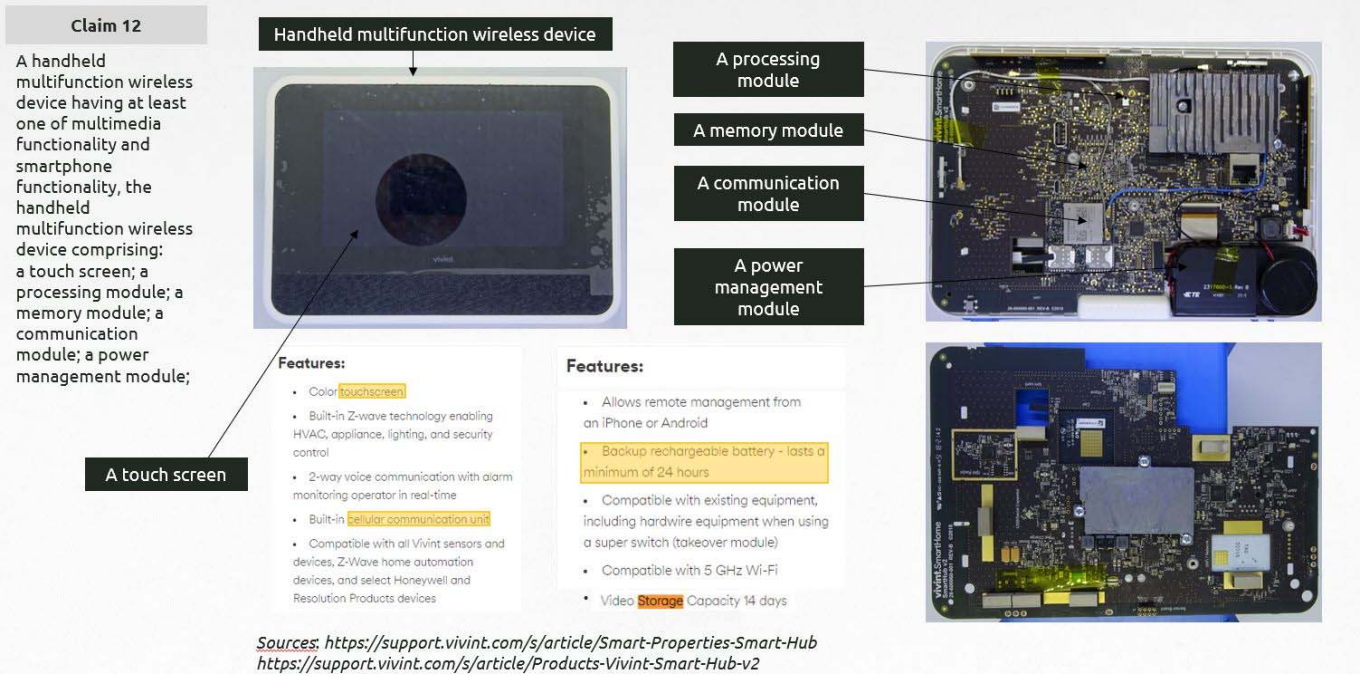
a. A perimeter of the second antenna element defines a second antenna contour comprising at least twenty segments.

34. Defendant has directly infringed and continues to infringe at least claim 12 of the '103 Patent in violation of 35 U.S.C. § 271(a) by its manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to certain alarm systems, alarm system components and/or aftermarket car telematics with internal antennas. As detailed below, the Infringing Products meet every element of the relevant claims of the '103 Patent literally or

under the doctrine of equivalents.[2]

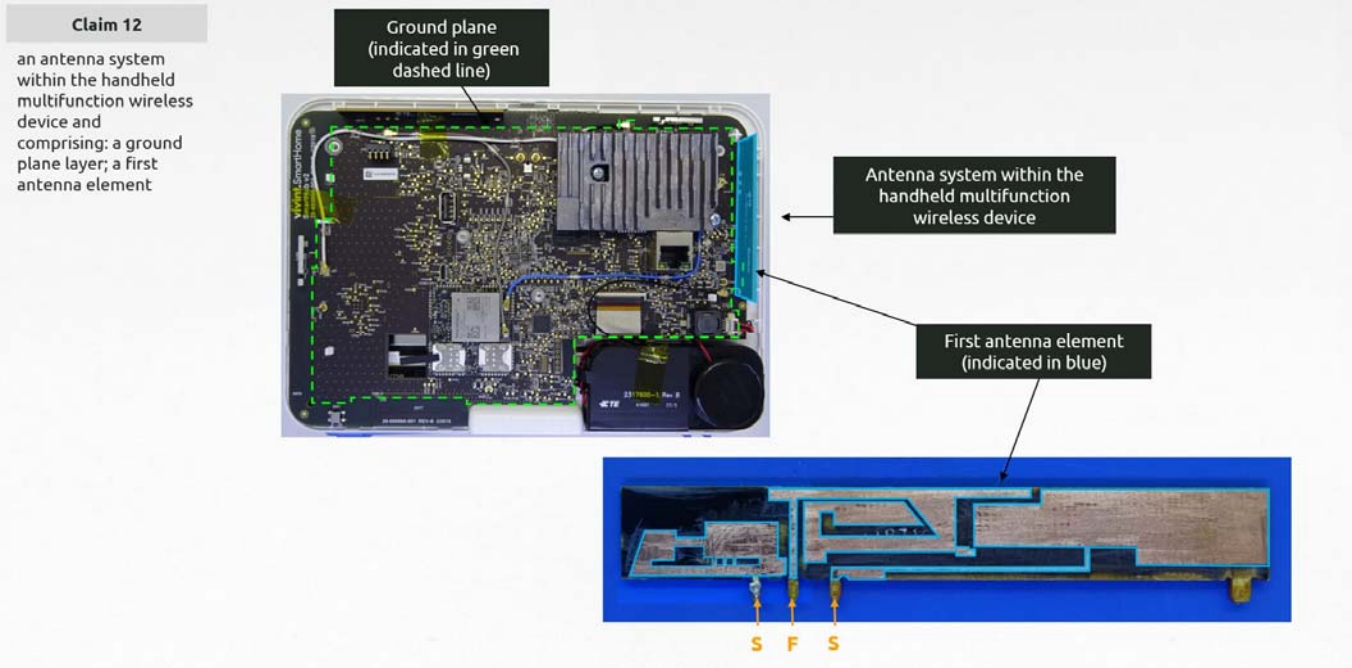
35. As an example, the Vivint Smart Hub Panel satisfies all of the claim limitations of at least claim 12 of the '103 Patent.

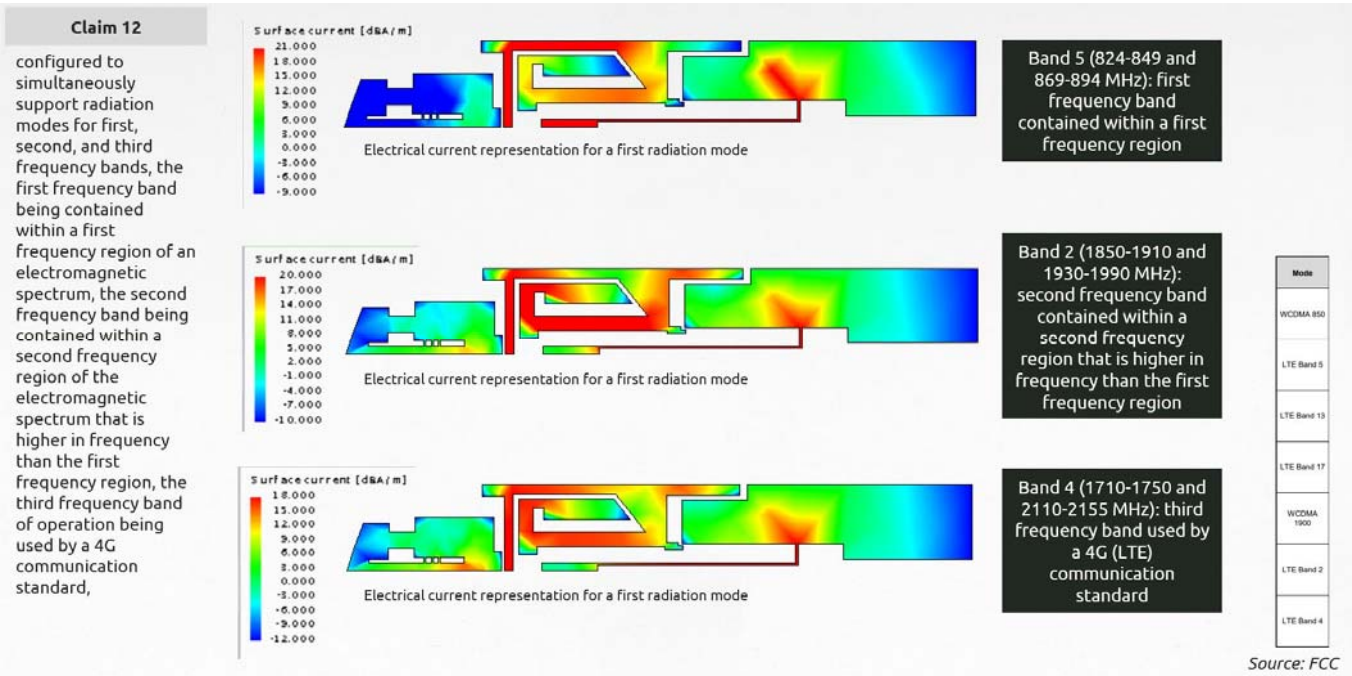
a. The device possesses a touchscreen, a processing module, a memory module, a communication module, a power management module, and the relevant functionalities.



b. The antenna system includes a ground plane layer and a first antenna element with the requisite frequency bands.

[2] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the '103 Patent.

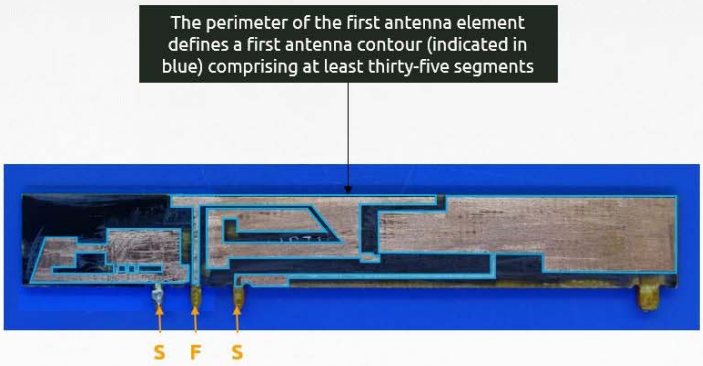




c. The first antenna element defines a contour comprising at least thirty-five segments and defines an antenna box with the relevant properties.

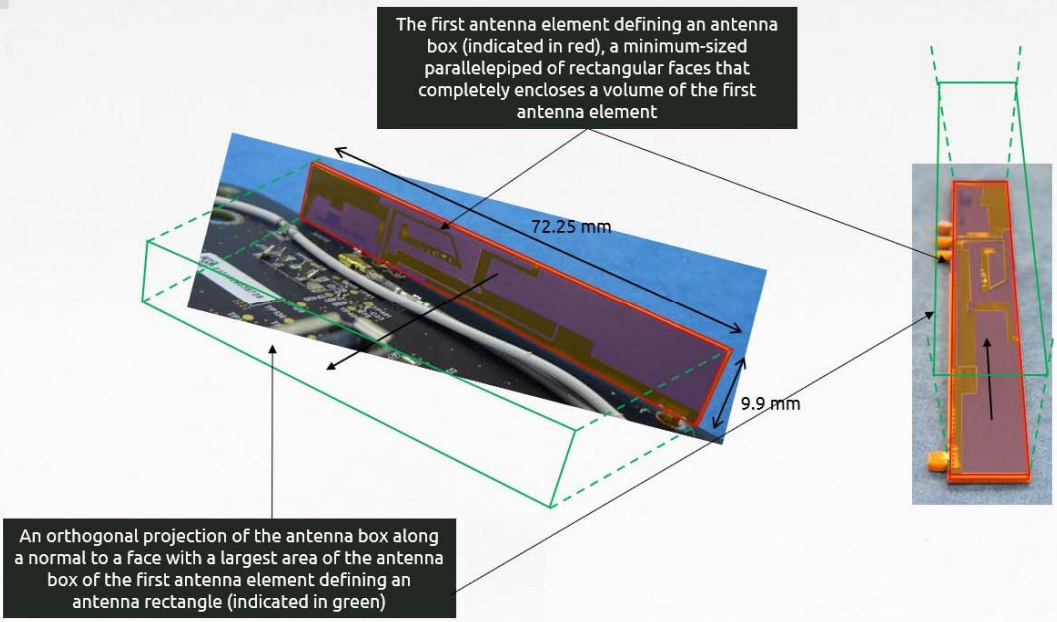
Claim 12

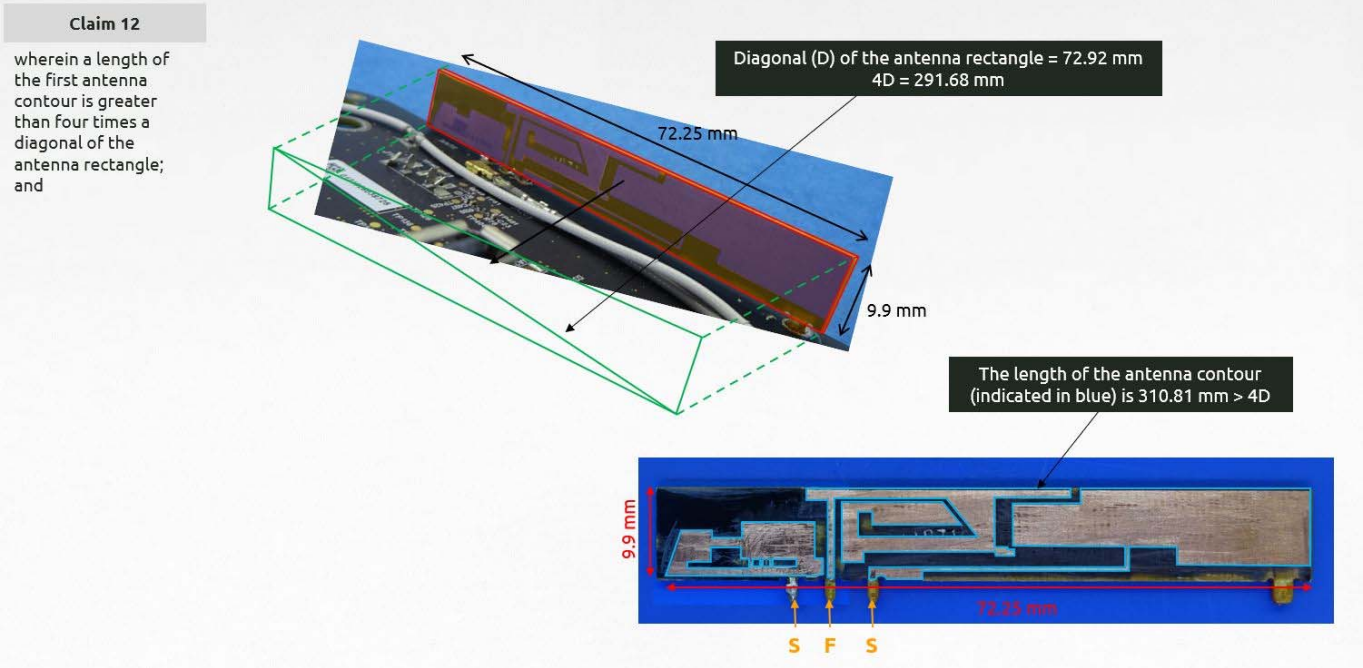
wherein a perimeter of the first antenna element defines a first antenna contour comprising at least thirty-five segments,



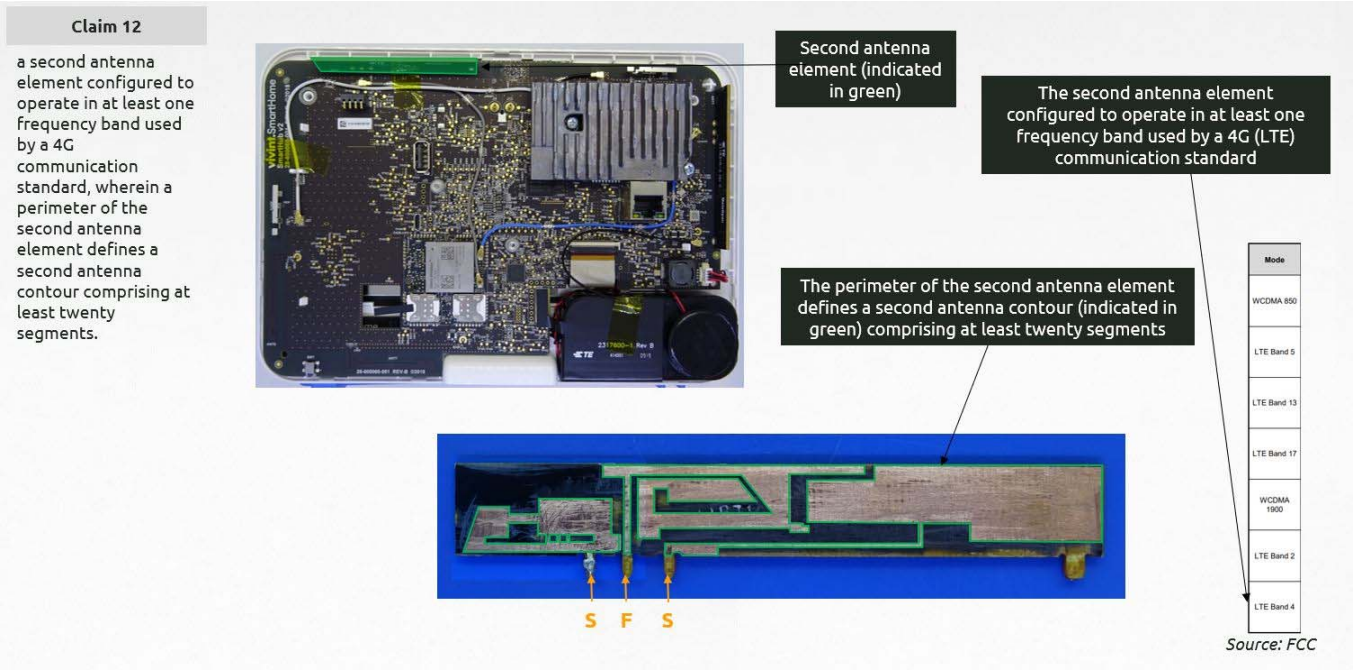
Claim 12

the first antenna element defining an antenna box, an orthogonal projection of the antenna box along a normal to a face with a largest area of the antenna box defining an antenna rectangle,





d. And the second antenna element possesses the relevant frequency properties and defines a contour comprising at least twenty segments.



36. Defendant has knowledge of the '103 Patent and has also indirectly infringed at least claim 12 of the '103 Patent by active inducement under 35 U.S.C. § 271(b). Defendant has induced,

caused, urged, encouraged, aided and abetted their direct and indirect customers to make, use, sell, offer for sale and/or import Infringing Products. Defendant has done so by acts including but not limited to selling Infringing Products to their customer; marketing Infringing Products; and providing instructions, technical support, and direct links to vendor websites (available via, e.g., https://shop.vivint.com/?ca=981748 [https://perma.cc/9RT7-BTNU?type=image] (last accessed 10/10/2022)) for the use of Infringing Products. Such conduct by Defendant was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

37. The acts of infringement by Defendant have caused damage to Fractus, and Fractus is entitled to recover from Defendant the damages sustained by Fractus as a result of Defendant's wrongful acts in an amount subject to proof at trial. The infringement of Fractus's exclusive rights under the '103 Patent by Defendant has damaged and will continue to damage Fractus, causing irreparable harm, for which there is no adequate remedy at law, unless enjoined by this Court.

INFRINGEMENT OF U.S. PATENT NO. 11,349,200

38. On May 31, 2022, United States Patent No. 11,349,200 (the " '200 Patent") was duly and legally issued for an invention entitled "Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices." A true and correct copy of the '200 Patent is attached as Exhibit 3.

39. The '200 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code.

40. The '200 Patent describes multiband antennas for multifunction wireless devices which combine mobile data and voice services within a single unit to enable smaller and thinner devices. The antennas are described in part through a "complexity factor" reflecting the complexity and degree of convolution of features the antenna demonstrates when viewed in detail.

41. For example, claim 11 of the ‘200 Patent recites:

a. A wireless device comprising:

i. An antenna system comprising a ground plane and at least two antennas within the wireless device, the antenna system comprising:

1. A first antenna configured to provide operation in at least three frequency bands being used by 4G communication standards,

a. The first antenna defining an antenna contour comprising an entire perimeter of the first antenna, the antenna contour comprising at least twenty segments, wherein the antenna contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20 and complexity factor F_{32} having a value of at least 1.35, and

b. Wherein the first antenna defines an antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and wherein each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna,

c. An orthogonal projection of the antenna box along a normal to a face with a largest area of the first antenna defining an antenna rectangle,

d. An aspect ratio of the antenna rectangle being defined

as a ratio between a width and a height of the antenna rectangle, wherein the aspect ratio has a value of at least 2; and

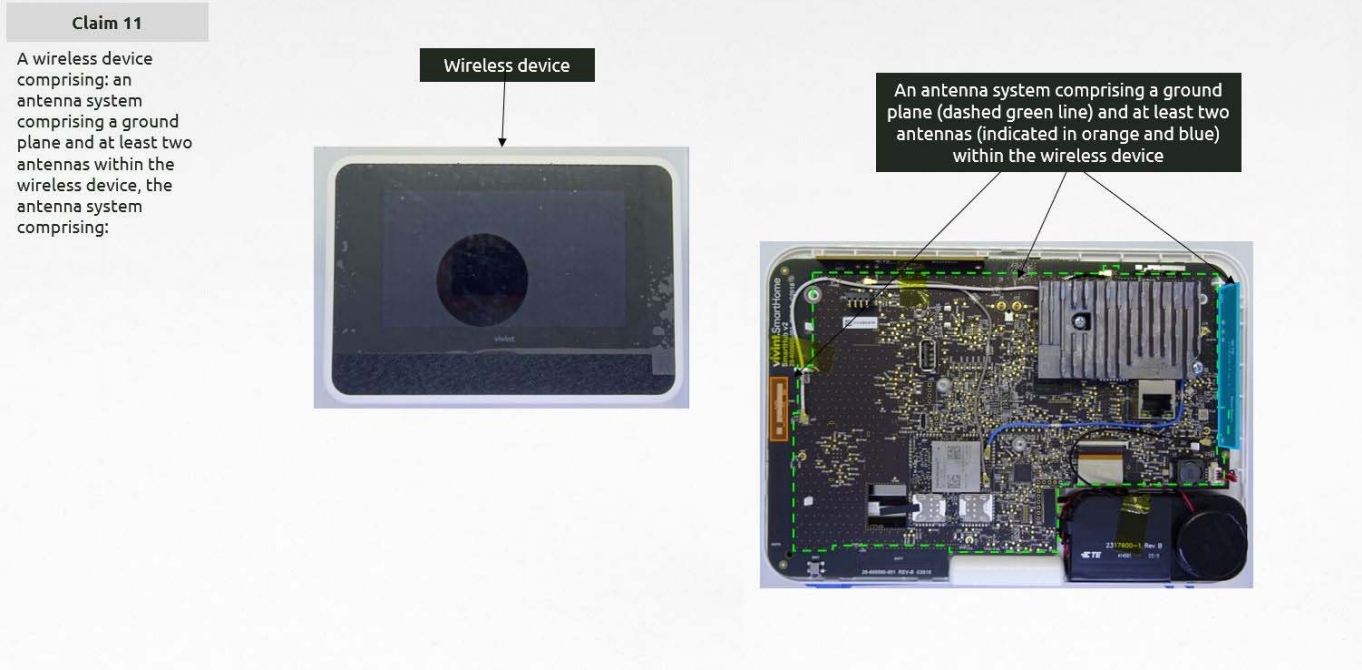
2. A second antenna configured to provide operation in a first wireless service, the second antenna being proximate to a side of a ground plane rectangle enclosing the ground plane.

42. Defendant has directly infringed and continues to infringe at least claim 11 of the '200 Patent by its manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to certain alarm systems, alarm system components and/or aftermarket car telematics with internal antennas. As detailed below, the Infringing Products meet every element of the relevant claims of the '200 Patent literally or under the doctrine of equivalents.[3]

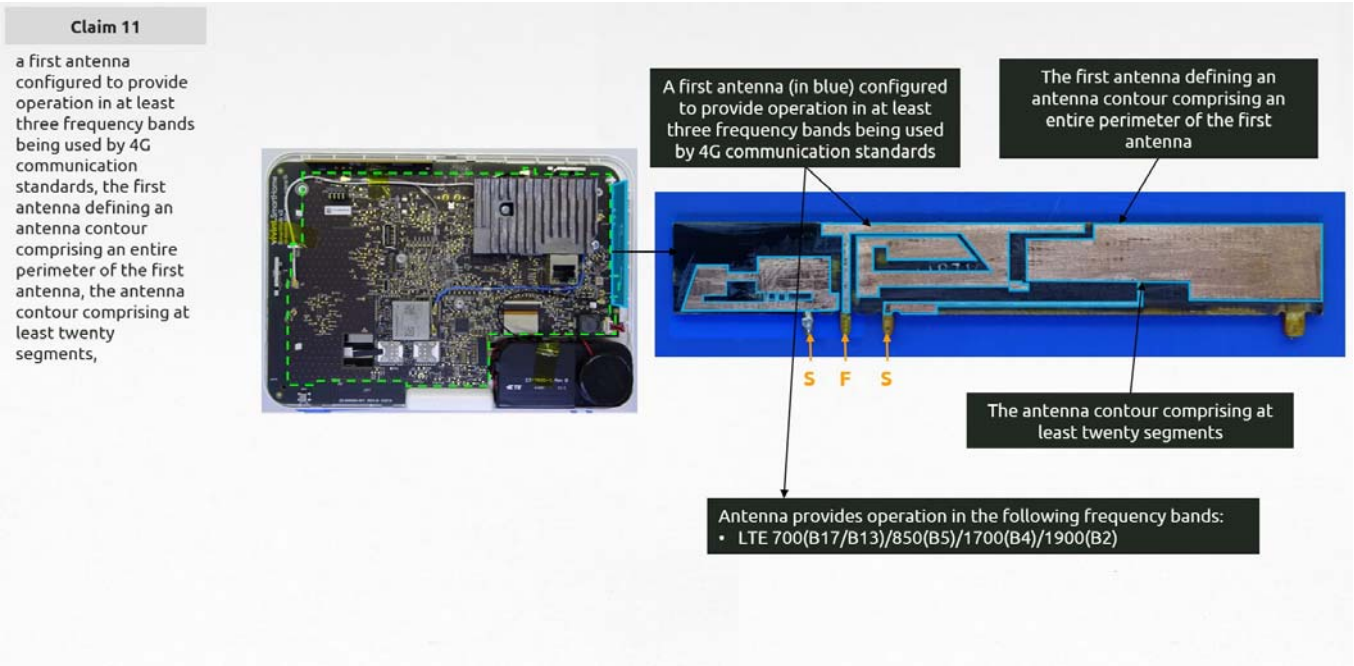
43. As an example, the Vivint Smart Hub satisfies all of the claim limitations of at least claim 11 of the '200 Patent.

a. It is a wireless device with an antenna system including a ground plane and at least 2 antennas within the device.

[3] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the '200 Patent.

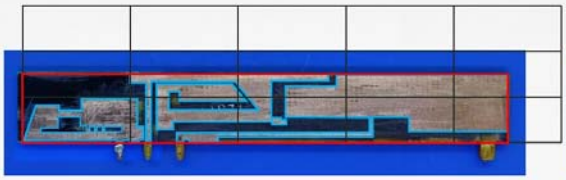


b. The antenna system comprises a first antenna that provides operation in at least three frequency bands used by 4G communication standards and this first antenna defines an antenna contour satisfying a minimum number of segments and the complexity factor requirements.

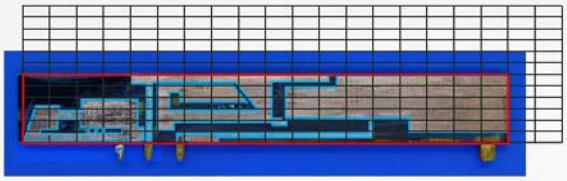


Claim 11

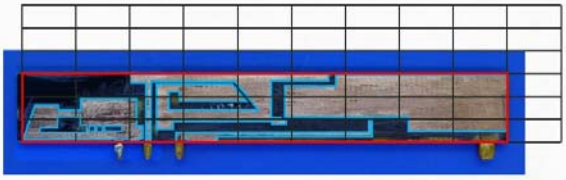
wherein the antenna contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20 and complexity factor F_{32} having a value of at least 1.35,



$N_1 = 10$



$N_3 = 79$



$N_2 = 26$

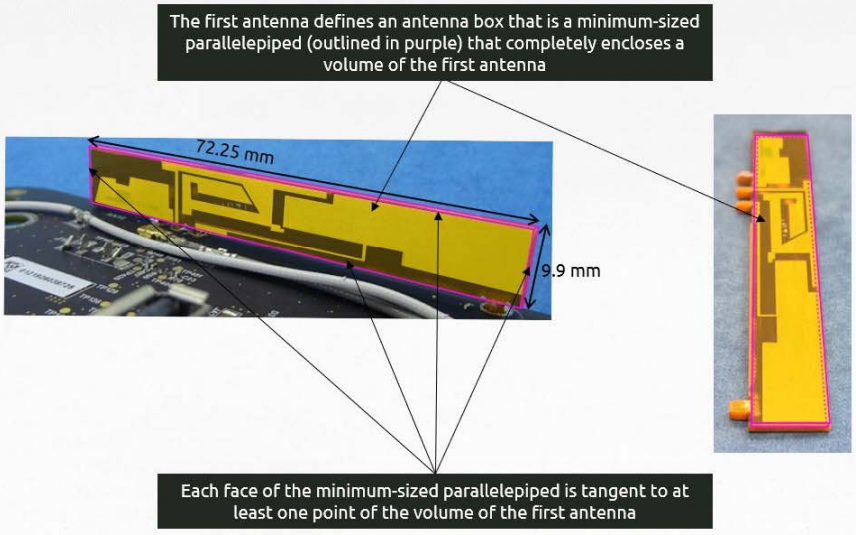
$$F_{21} = -\frac{\log(N_2) - \log(N_1)}{\log(1/2)} = -\frac{\log(26) - \log(10)}{\log(1/2)} = 1.38 \geq 1.20$$

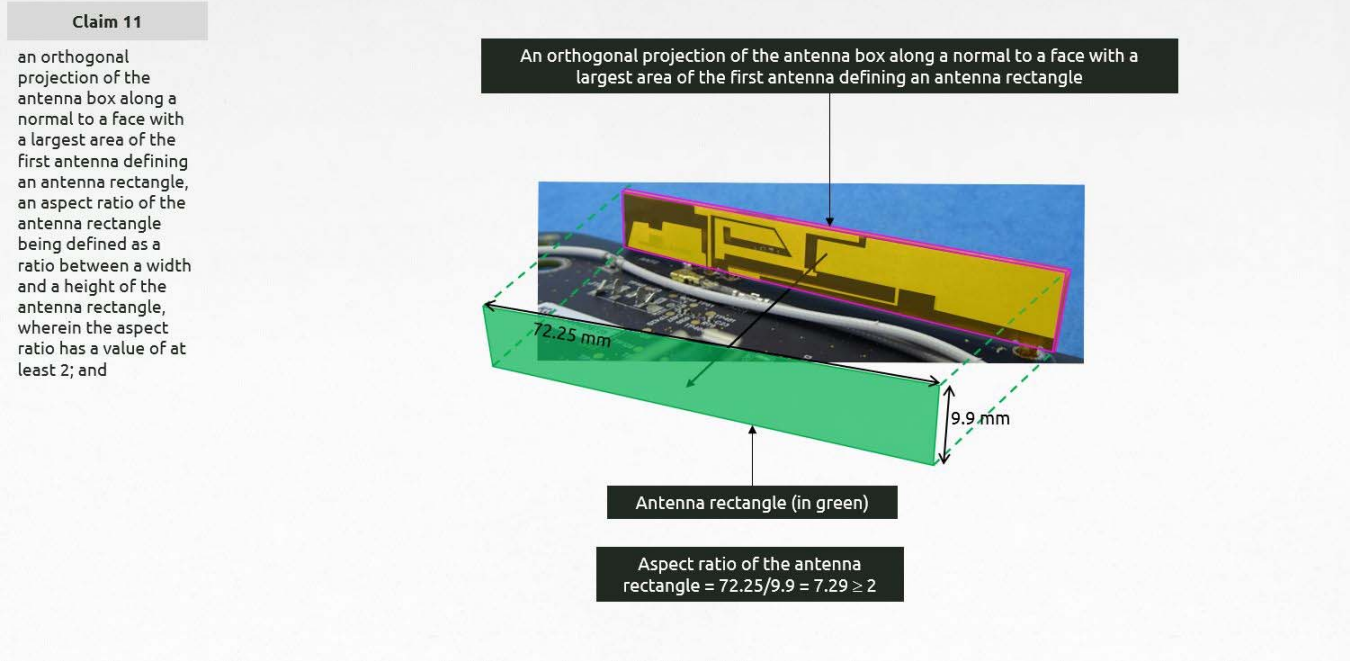
$$F_{32} = -\frac{\log(N_3) - \log(N_2)}{\log\left(\frac{1}{2}\right)} = -\frac{\log(79) - \log(26)}{\log\left(\frac{1}{2}\right)} = 1.60 \geq 1.35$$

c. The first antenna complies with the relevant aspect ratio and footprint requirements.

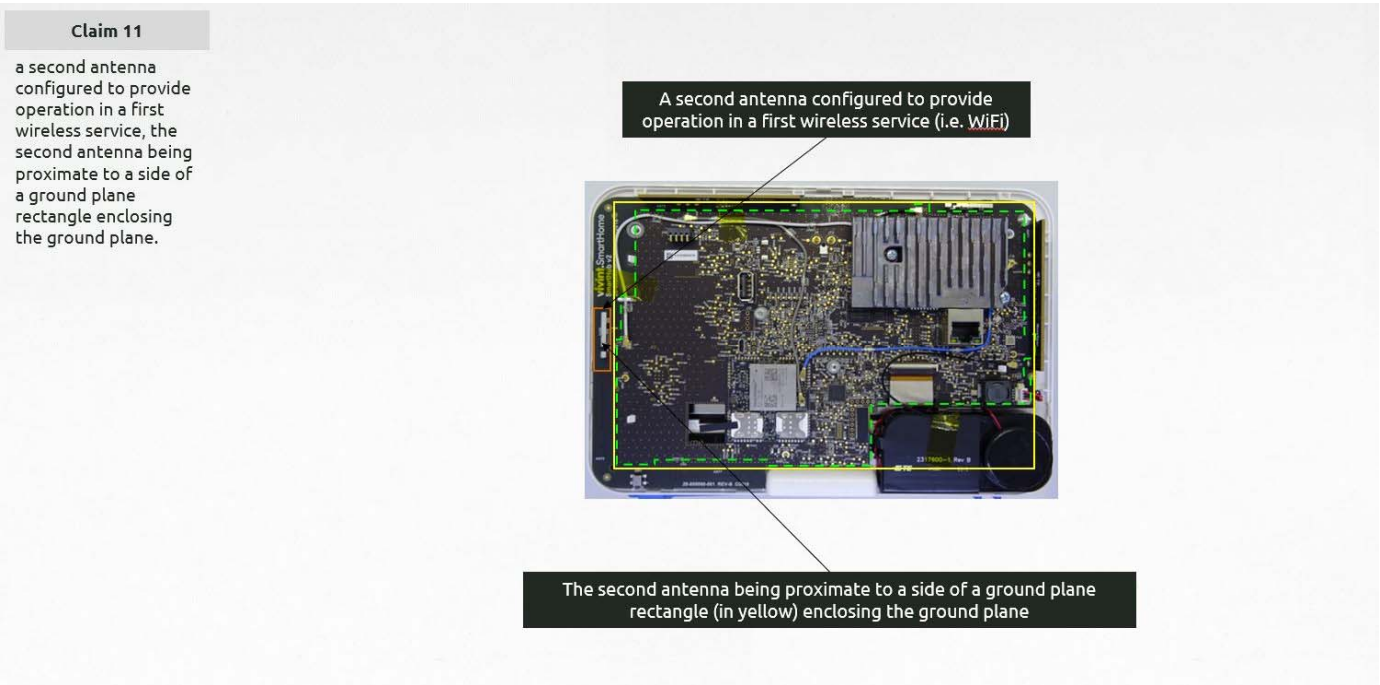
Claim 11

and wherein the first antenna defines an antenna box that is a minimum-sized parallelepiped that completely encloses a volume of the first antenna and wherein each face of the minimum-sized parallelepiped is tangent to at least one point of the volume of the first antenna,





d. The antenna system also comprises a second antenna providing operation in a wireless service and which is proximate to a side of the rectangle describing the ground plane.



44. Defendant has knowledge of the '200 Patent and has also indirectly infringed at least claim 11 of the '200 Patent by active inducement under 35 U.S.C. § 271(b). Defendant has induced, caused, urged, encouraged, aided and abetted their direct and indirect customers to make, use, sell, offer for sale and/or import Infringing Products. Defendant has done so by acts including but not limited to selling Infringing Products to their customer; marketing Infringing Products; and providing instructions, technical support, and direct links to vendor websites (available via, e.g., https://shop.vivint.com/?ca=981748 [https://perma.cc/9RT7-BTNU?type=image] (last accessed 10/10/2022)) for the use of Infringing Products. Such conduct by Defendant was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

45. The acts of infringement by Defendant have caused damage to Fractus, and Fractus is entitled to recover from Defendant the damages sustained by Fractus as a result of Defendant's wrongful acts in an amount subject to proof at trial. The infringement of Fractus's exclusive rights under the '200 Patent by Defendant has damaged and will continue to damage Fractus, causing irreparable harm, for which there is no adequate remedy at law, unless enjoined by this Court.

INFRINGEMENT OF U.S. PATENT NO. 8,994,604

46. On March 31, 2015, United States No. 8,994,604 (the " '604 Patent") was duly and legally issued for an invention entitled "Coupled Multiband Antennas." A true and correct copy of the '604 Patent is attached as Exhibit 4.

47. The '604 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '604 Patent expired on October 9, 2022.

48. The '604 Patent describes antennas with two radiating arm structures which are coupled together by means of a close proximity region to form a small antenna with broadband and / or multiband behavior.

49. For example, claim 1 of the '604 Patent recites:

a. A wireless portable device comprising:

i. A printed circuit board comprising a ground plane structure;

ii. An antenna system operating in multiple frequency bands

iii. The antenna system comprising:

1. A first radiating arm comprising a first-radiating-arm first tip, a first-radiating-arm second tip, and a feeding terminal connected to the first-radiating-arm first tip, wherein the first radiating arm is not connected to the ground plane structure through a grounding terminal; and

2. A second radiating arm comprising a second-radiating-arm first tip, a second-radiating-arm second tip, and a grounding terminal connected to the second-radiating-arm first tip, wherein the second radiating arm does not include a contact point with first radiating arm,

iv. Wherein:

1. The first radiating arm and the second radiating arm are coupled through a close proximity region from a first specific portion of the first radiating arm and from a second specific portion of the second radiating arm;

2. A length of a line segment between a point of the first specific portion and a point of the second specific portion is shorter than a distance between the feeding terminal and the grounding terminal;

3. An orthogonal projection of the line segment onto a plane of the ground plane structure does not intersect the ground plane structure; and

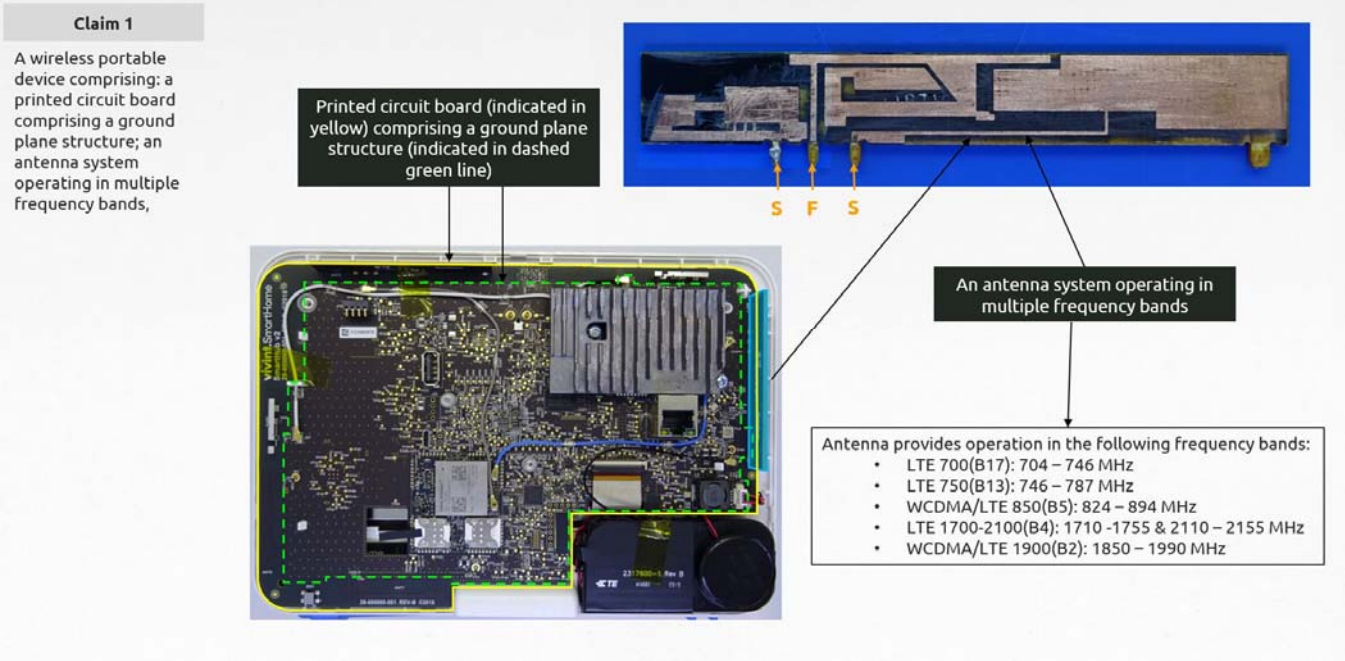
4. The first radiating arm, the second radiating arm and the close proximity region are configured to simultaneously provide the bandwidth required for the antenna system to operate in the multiple frequency bands.

50. Defendant has directly infringed at least claim 1 of the '604 Patent in violation of 35 U.S.C. § 271(a) by its manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to certain alarm systems, alarm system components and/or aftermarket car telematics with internal antennas. As detailed below, the Infringing Products meet every element of the relevant claims of the '604 Patent literally or under the doctrine of equivalents.[4]

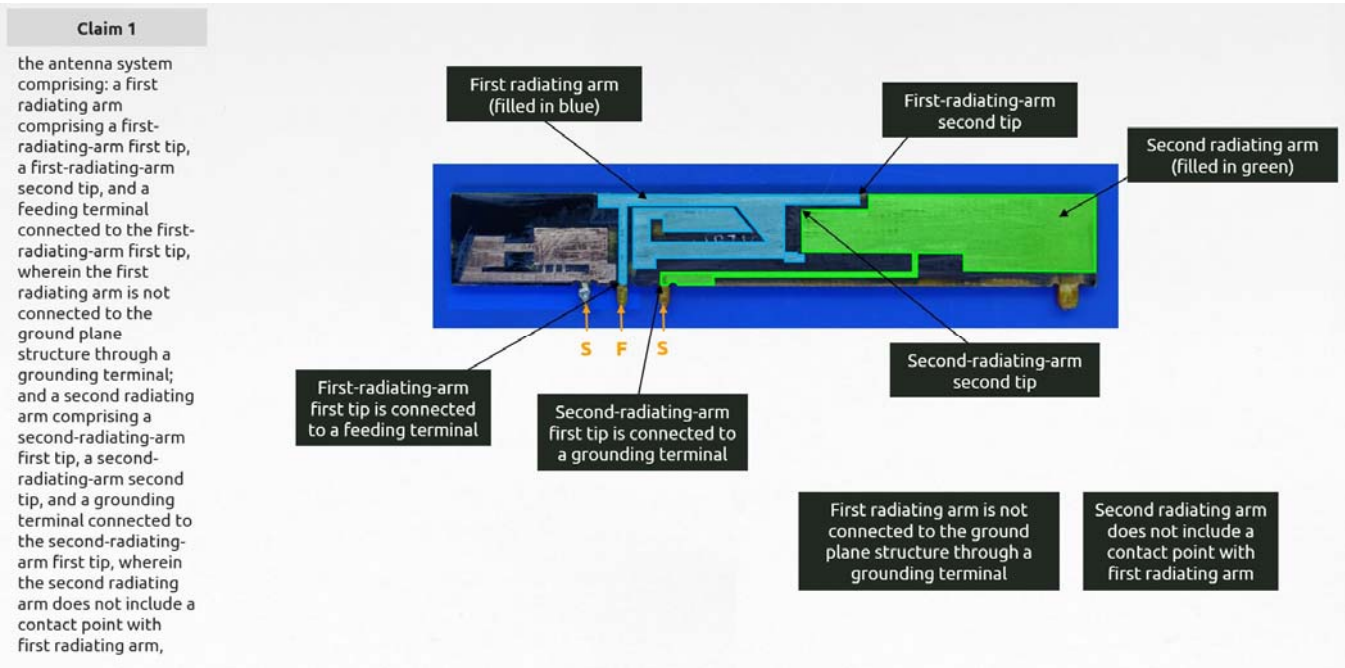
51. For example, the Vivint Smart Hub Panel satisfies all of the claim limitations of at least claim 1 of the '604 Patent.

a. The panel is a portable device comprising a printed circuit board comprising a ground plane and a multi-band antenna system.

[4] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the '604 Patent.

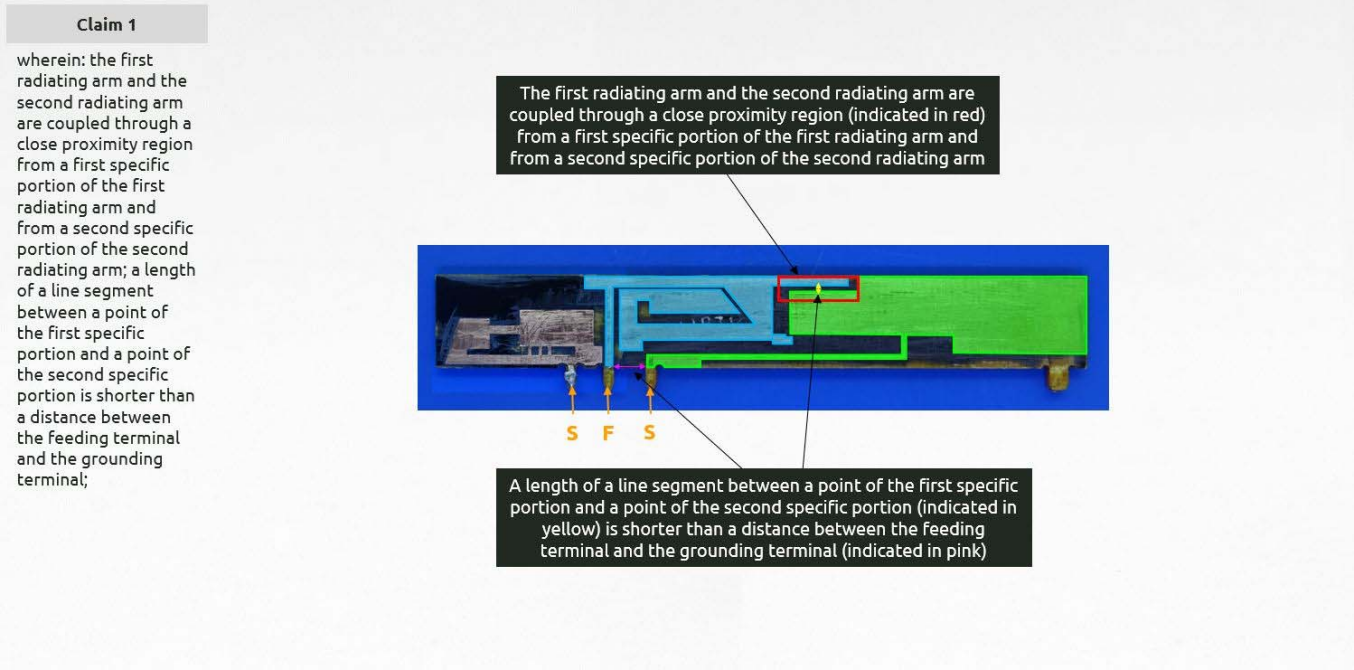


b. The antenna system comprises a first and a second radiating arms with the relevant properties and arm tip requirements.

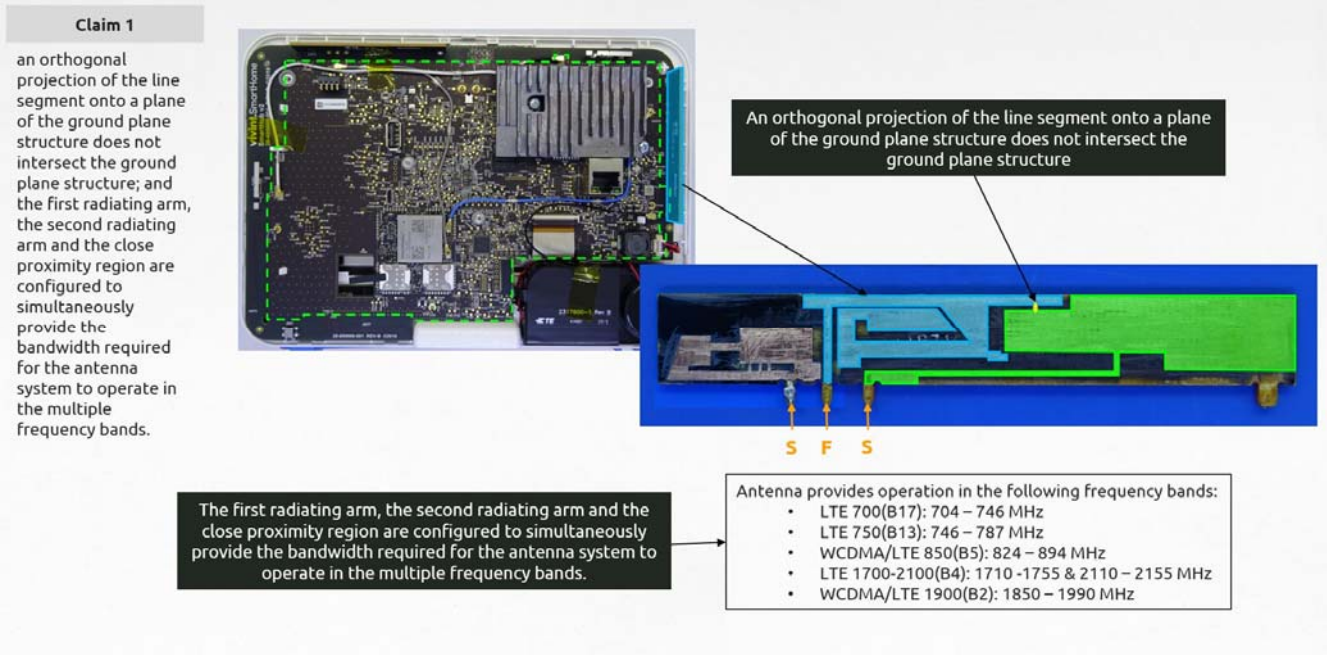


c. Both first and second radiating arms are coupled through a close proximity region,

with a line segment between two specific portions from both arms being shorter than the distance between the feeding and grounding terminal.



d. An orthogonal projection of the line segment does not intersect the ground plane, and both the first and second radiating arms and the close proximity region provide the relevant bandwidth required for the multi-band antenna to operate.



52. Defendant has knowledge of the '604 Patent and has also indirectly infringed at least claim 1 of the '604 Patent by active inducement under 35 U.S.C. § 271(b). Defendant has induced, caused, urged, encouraged, aided and abetted their direct and indirect customers to make, use, sell, offer for sale and/or import Infringing Products. Defendant has done so by acts including but not limited to selling Infringing Products to their customer; marketing Infringing Products; and providing instructions, technical support, and direct links to vendor websites (available via, e.g., https://shop.vivint.com/?ca=981748 [https://perma.cc/9RT7-BTNU?type=image] (last accessed 10/10/2022)) for the use of Infringing Products. Such conduct by Defendant was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

53. The acts of infringement by Defendant have caused damage to Fractus, and Fractus is entitled to recover from Defendant the damages sustained by Fractus as a result of Defendant's wrongful acts in an amount subject to proof at trial.

INFRINGEMENT OF U.S. PATENT NO. 10,135,138

54. On November 20, 2018, United States Patent No. 10,135,138 (the " '138 Patent") was duly and legally issued for an invention entitled "Coupled Multiband Antennas." A true and correct copy of the '138 Patent is attached as Exhibit 5.

55. The '138 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '138 Patent expired on September 10, 2022.

56. Like the '604 Patent, the '138 Patent describes antennas with two radiating arm structures which are coupled together by means of a close proximity region to form a small antenna with broadband and / or multiband behavior.

57. For example, claim 1 of the '138 Patent recites:

a. An apparatus comprising:

i. An antenna having a multi-band behavior, the antenna being arranged within the apparatus and

ii. The antenna comprising:

1. A ground plane;

2. A first radiating structure fed through a feeding terminal and including a plurality of first conductive traces connected end-to-end in a folded arrangement,

a. The first radiating structure having a length extending along a non-straight path formed by the first conductive traces from a first end at the feeding terminal to a second, open end and having a width perpendicular to the non-straight path formed by the first conductive traces,

b. Wherein the width of the first radiating structure varies over

an extent of the first radiating structure; and

3. A second radiating structure connected to the ground plane through a grounding terminal,

    a. The second radiating structure including a plurality of second conductive traces connected end-to-end in a folded arrangement and having a length extending along a non-straight path formed by the second conductive traces from a first end at the grounding terminal to a second, open end,

    b. The second radiating structure being separated from the first radiating structure by a distance that is non-constant over an extent of the first and second radiating structures, the distance being in a direction that is orthogonal to at least one of the first and second radiating structures, wherein:

4. The first and second radiating structures and the distance between the first and second radiating structures are configured to enable the antenna to operate at a first frequency range and a second separate frequency range higher in frequency than the first frequency range;

5. The distance between the first and second radiating structures is configured to transfer electromagnetic fields from the first radiating structure to the second radiating structure at the second frequency range; and

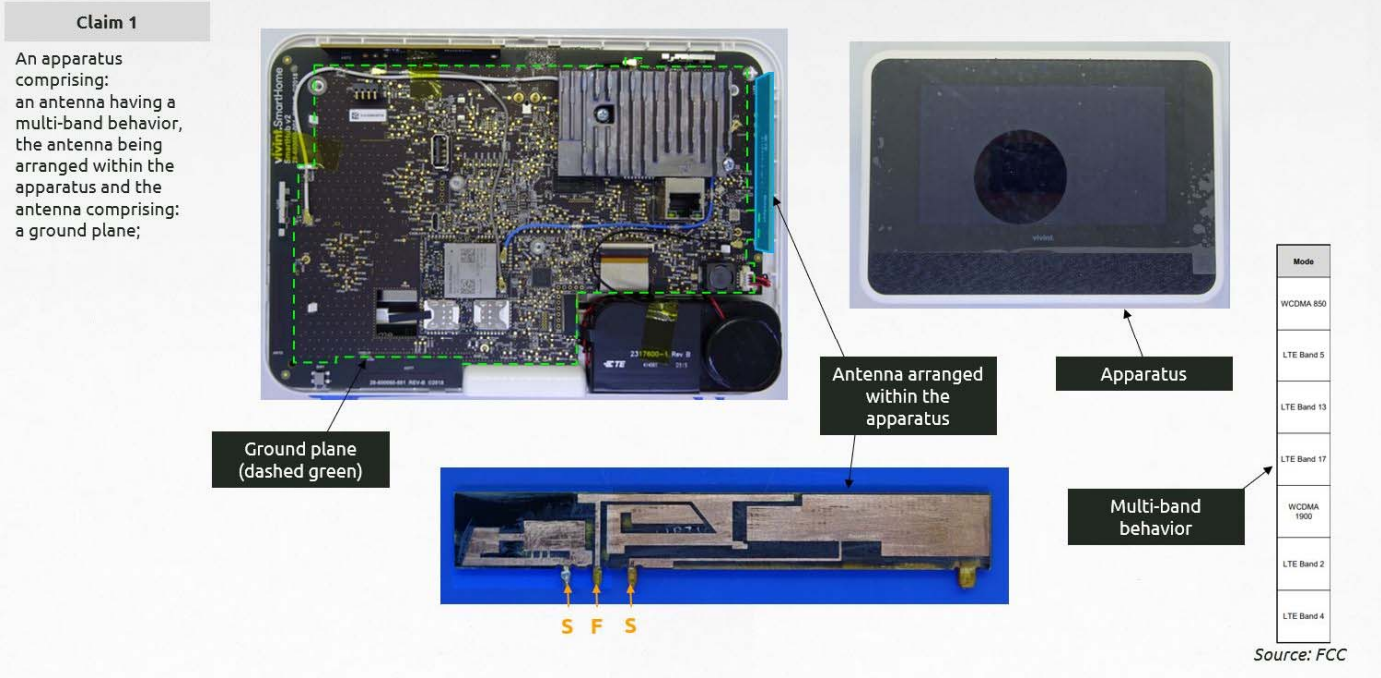
6. The length of the second radiating structure is configured to increase the resulting bandwidth of the antenna at the second frequency range

in relation to the bandwidth of the first radiating structure.

58. Defendant has directly infringed at least claim 1 of the '138 Patent in violation of 35 U.S.C. § 271(a) by its manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to certain alarm systems, alarm system components and/or aftermarket car telematics with internal antennas. As detailed below, the Infringing Products meet every element of the relevant claims of the '138 Patent literally or under the doctrine of equivalents.[5]

59. For example, the Vivint Smart Hub Panel satisfies all of the claim limitations of at least claim 1 of the '138 Patent.

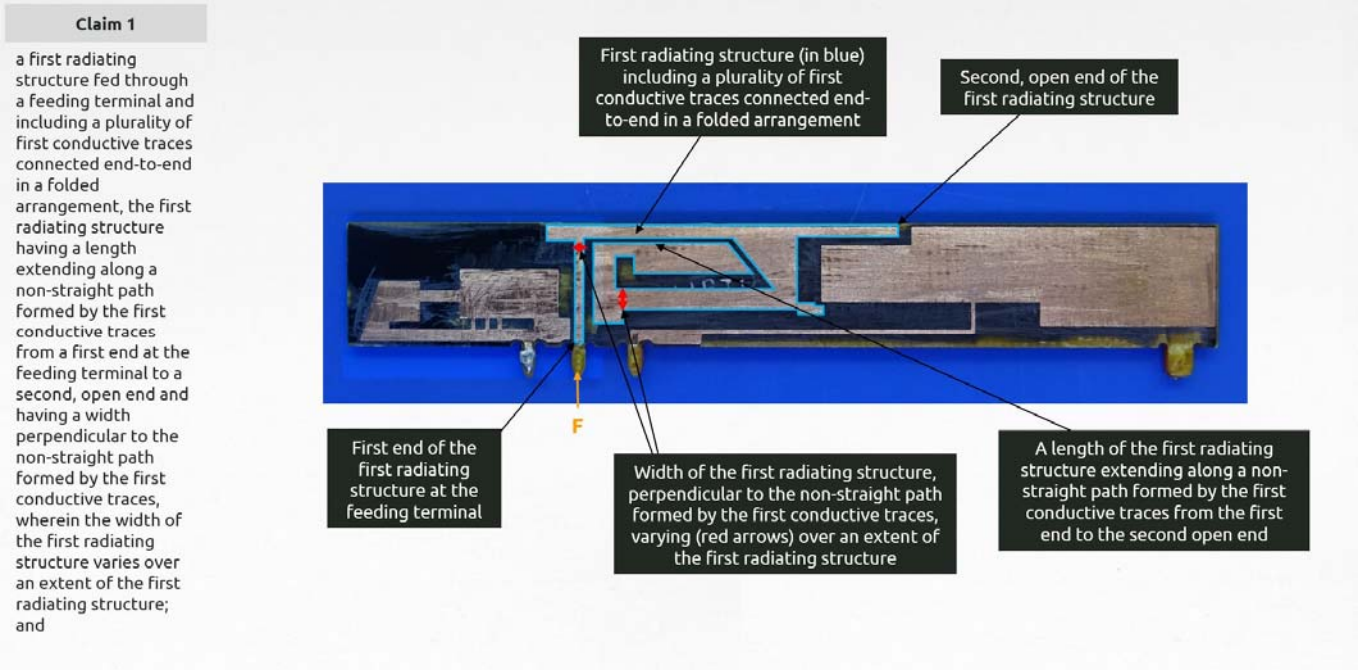
a. The Panel is an apparatus with an interior antenna having multi-band behavior along with a ground plane.



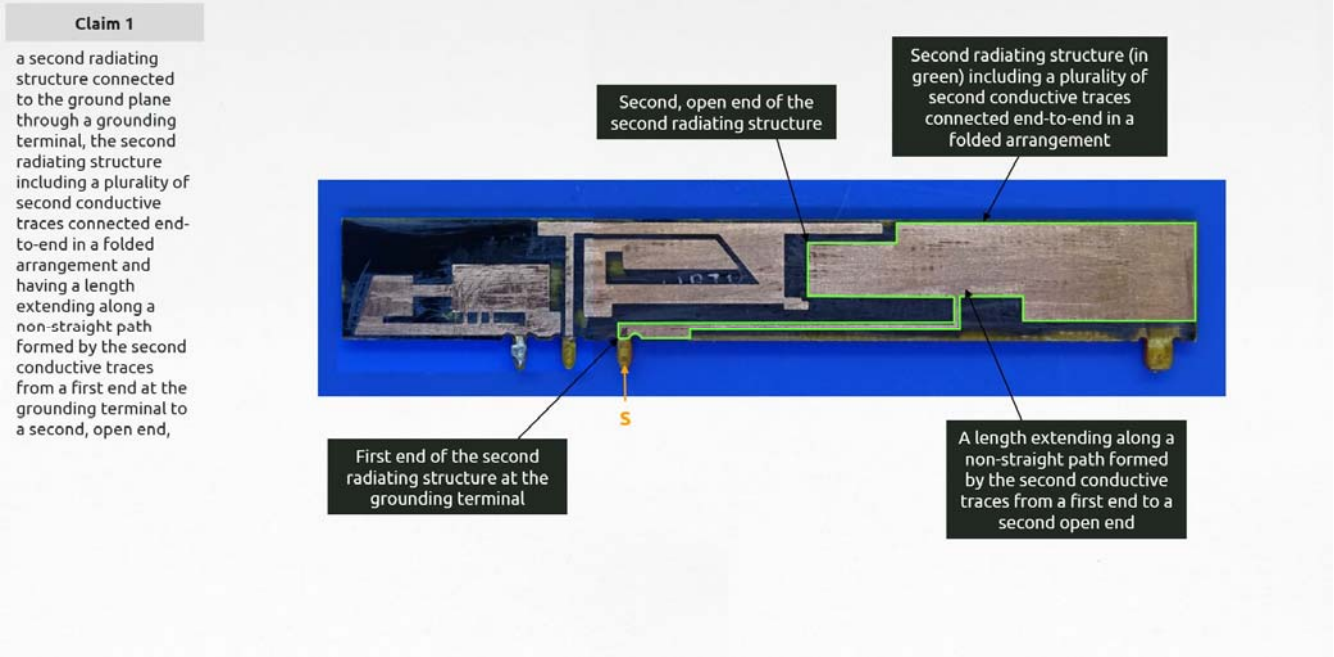
b. The antenna possesses a first radiating structure fed through a feeding terminal with conductive traces connected in a folded arrangement. The first radiating structure

[5] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the '138 Patent.

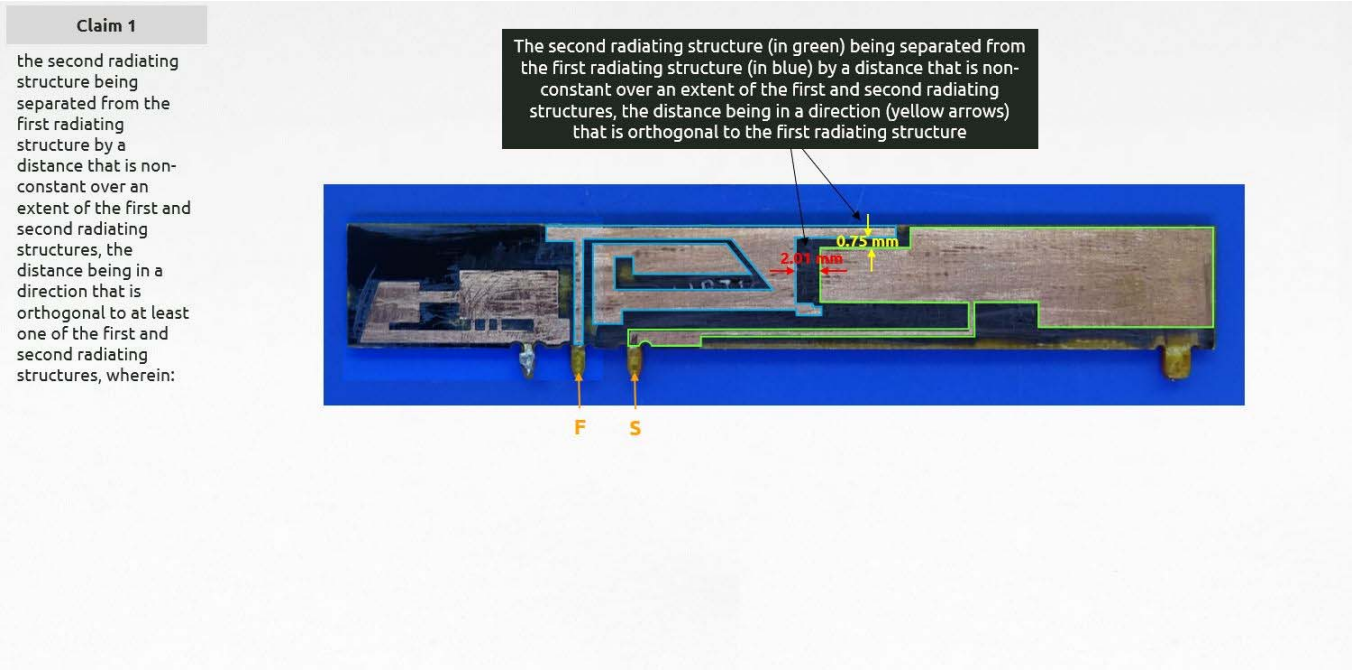
extends along a non-straight path by conductive traces from the feeding terminal to a second open end with a width varying and perpendicular to the non-straight path.



c. The second radiating structure is connected to the ground plane through the ground terminal and possess the relevant arrangement of conductive traces.

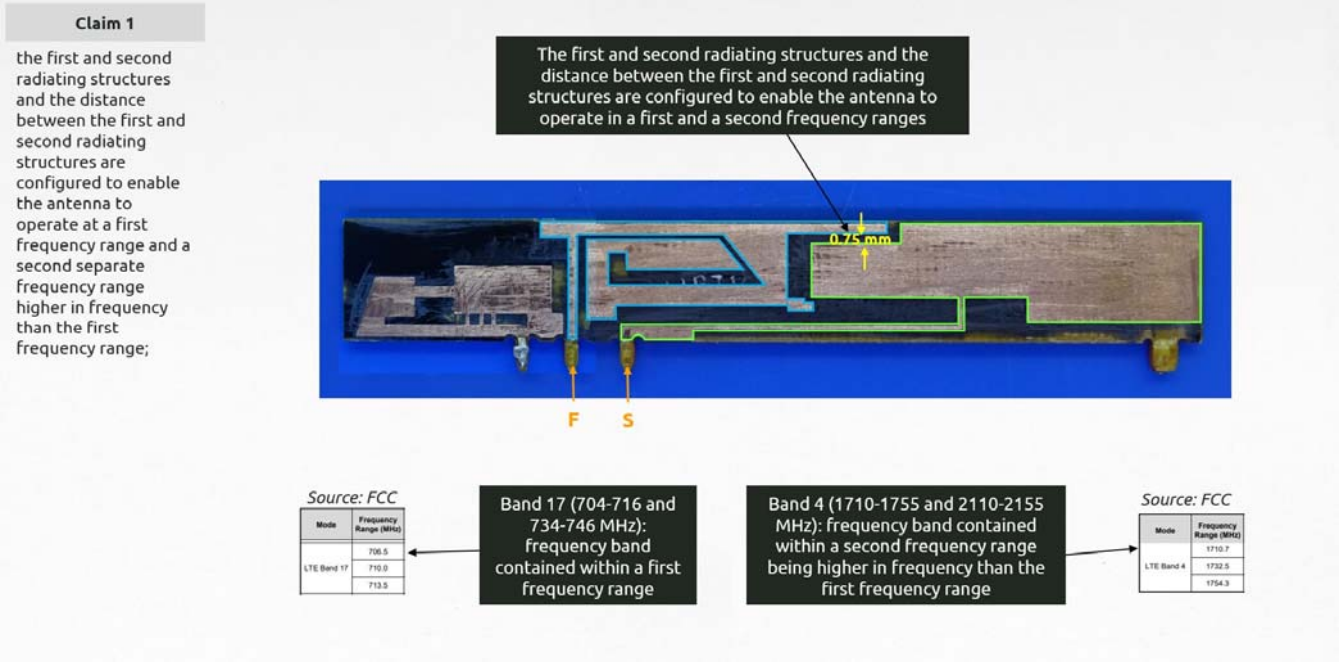


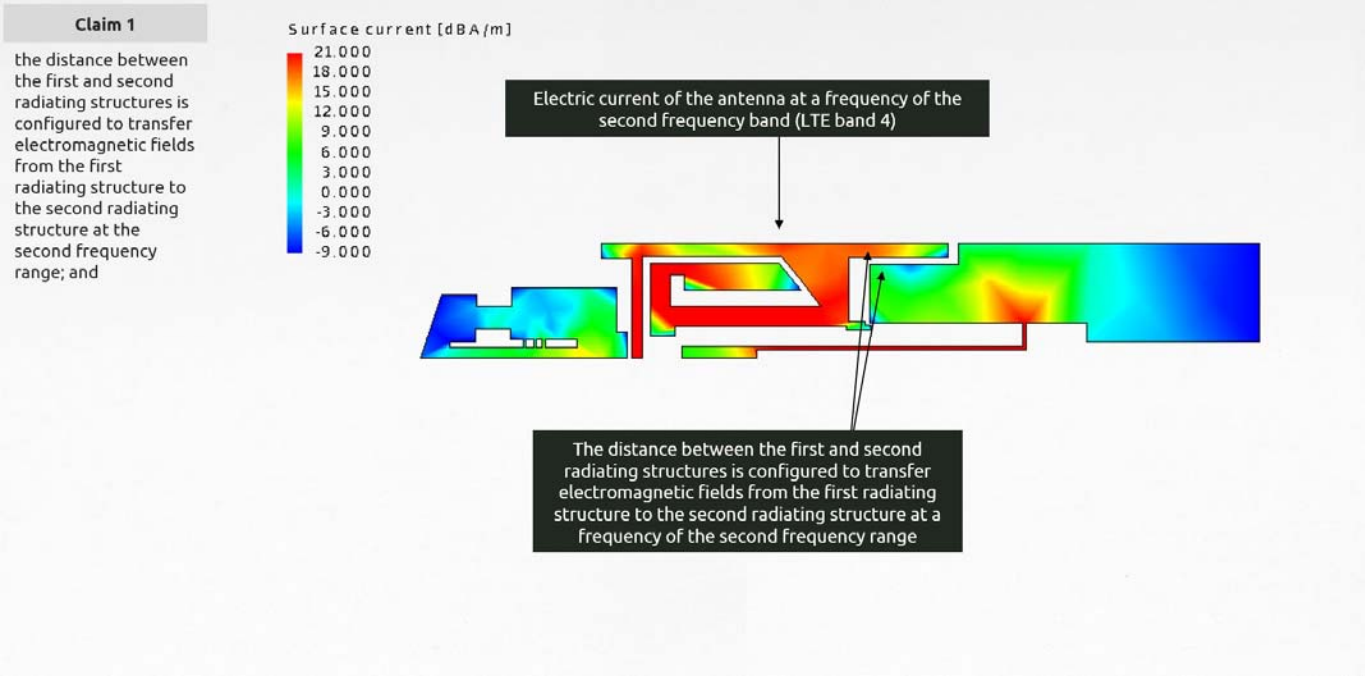
d. The second radiating structure is separate from the first radiating structure by a distance which is non-constant and orthogonal to at least one of the two radiating structures.

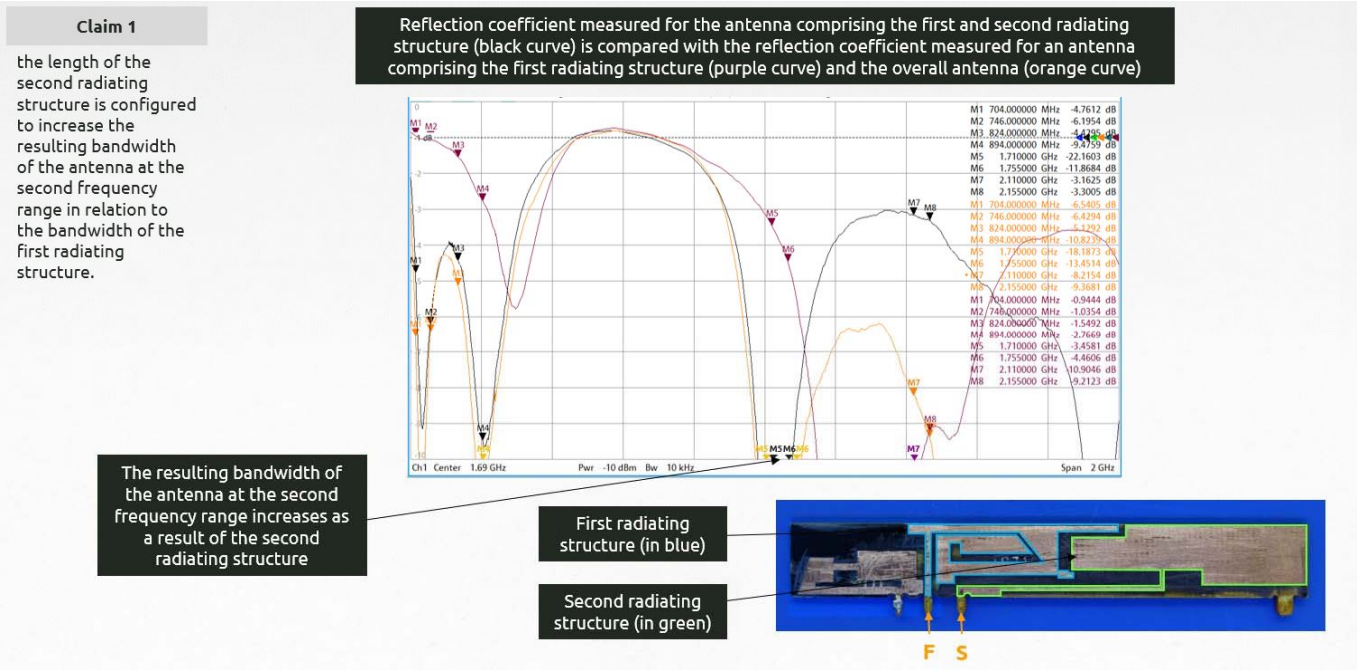


e. The distance between the two structures is configured to enable operation

at the relevant frequency ranges and to transfer electromagnetic fields between the structures at the proper frequencies. Additionally, the length of the second structure is configured to increase the bandwidth of the antenna at the relevant ranges relative to the bandwidth of the first radiating structure.







60. Defendant has knowledge of the '138 Patent and has also indirectly infringed at least claim 1 of the '138 Patent by active inducement under 35 U.S.C. § 271(b). Defendant has induced, caused, urged, encouraged, aided and abetted their direct and indirect customers to make, use, sell, offer for sale and/or import Infringing Products. Defendant has done so by acts including but not

limited to selling Infringing Products to their customer; marketing Infringing Products; and providing instructions, technical support, and direct links to vendor websites (available via, e.g., https://shop.vivint.com/?ca=981748 [https://perma.cc/9RT7-BTNU?type=image] (last accessed 10/10/2022)) for the use of Infringing Products. Such conduct by Defendant was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

61. The acts of infringement by Defendant have caused damage to Fractus, and Fractus is entitled to recover from Defendant the damages sustained by Fractus as a result of Defendant's wrongful acts in an amount subject to proof at trial.

INFRINGEMENT OF U.S. PATENT NO. 10,468,770

62. On November 5, 2019, United States Patent No. 10,468,770 (the " '770 Patent") was duly and legally issued for an invention entitled "Coupled Multiband Antennas." A true and correct copy of the '770 Patent is attached as Exhibit 6.

63. The '770 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '770 Patent expired on September 10, 2022.

64. Like the '138 Patent, the '770 Patent describes antennas with two radiating arm structures which are coupled together by means of a close proximity region to form a small antenna with broadband and / or multiband behavior.

65. For example, claim 1 of the '770 Patent recites:

a. An apparatus comprising:

i. An antenna having a multi-band behavior, the antenna being arranged within the apparatus and

ii. The antenna comprising:

1. A ground plane;

2. A first radiating structure fed through a feeding terminal and including a plurality of first conductive traces connected end-to-end in a folded arrangement,

a. The first radiating structure having a length extending along a non-straight path formed by the first conductive traces from a first end at the feeding terminal to a second, open end; and

3. A second radiating structure connected to the ground plane through a grounding terminal, the second radiating structure including a plurality of second conductive traces connected end-to-end in a folded arrangement and

a. Having a length extending along a non-straight path formed by the second conductive traces from a first end at the grounding terminal to a second, open end,

b. The second radiating structure being separated from the first radiating structure by a distance that is non-constant over an extent of the first and second radiating structures, the distance being in a direction that is orthogonal to at least one of the first and second radiating structures, wherein:

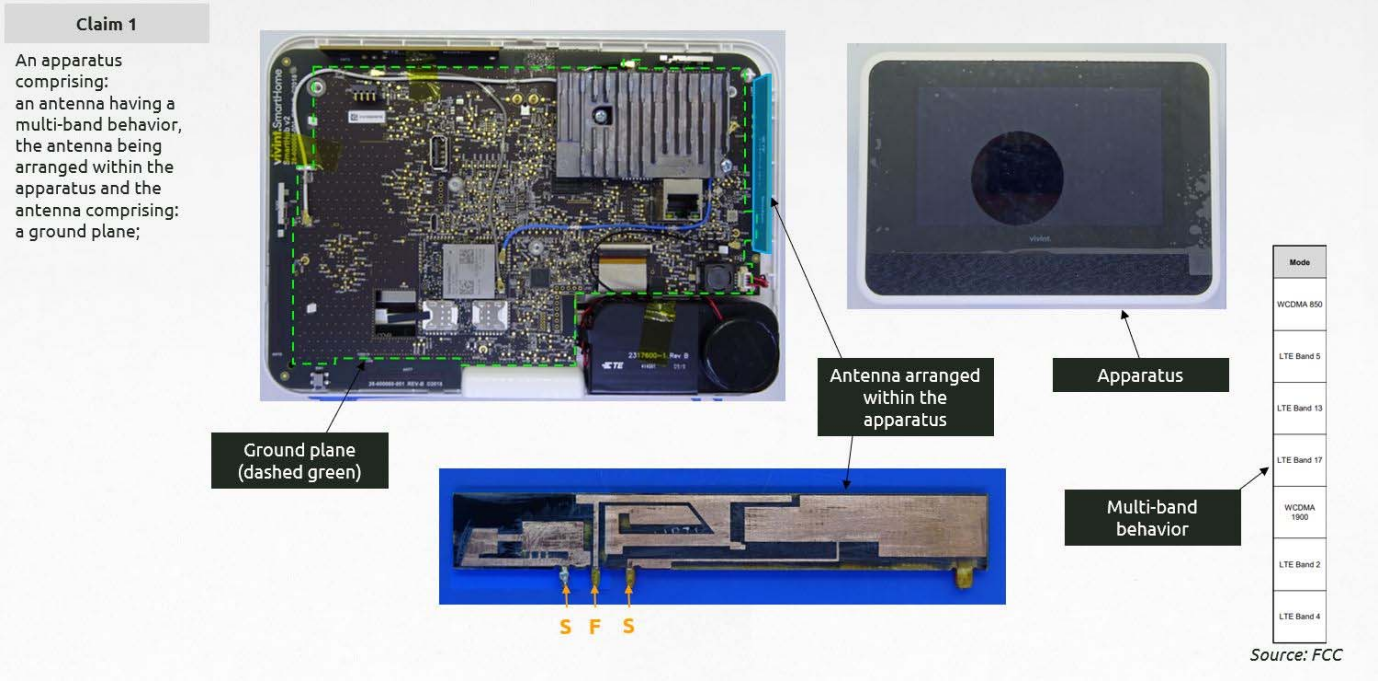
iii. The first and second radiating structures and the distance between the first and second radiating structures are configured to enable the antenna to operate at a first frequency band, a second separate frequency band higher in frequency than the first frequency band, and a third frequency band higher than the second frequency band; and

iv. The distance between the first and second radiating structures is configured to transfer electromagnetic fields from the first radiating structure to the second radiating structure at least at the second frequency band.

66. Defendant has directly infringed at least claim 1 of the '770 Patent in violation of 35 U.S.C. § 271(a) by its manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to certain alarm systems, alarm system components and/or aftermarket car telematics with internal antennas. As detailed below, the Infringing Products meet every element of the relevant claims of the '770 Patent literally or under the doctrine of equivalents.[6]

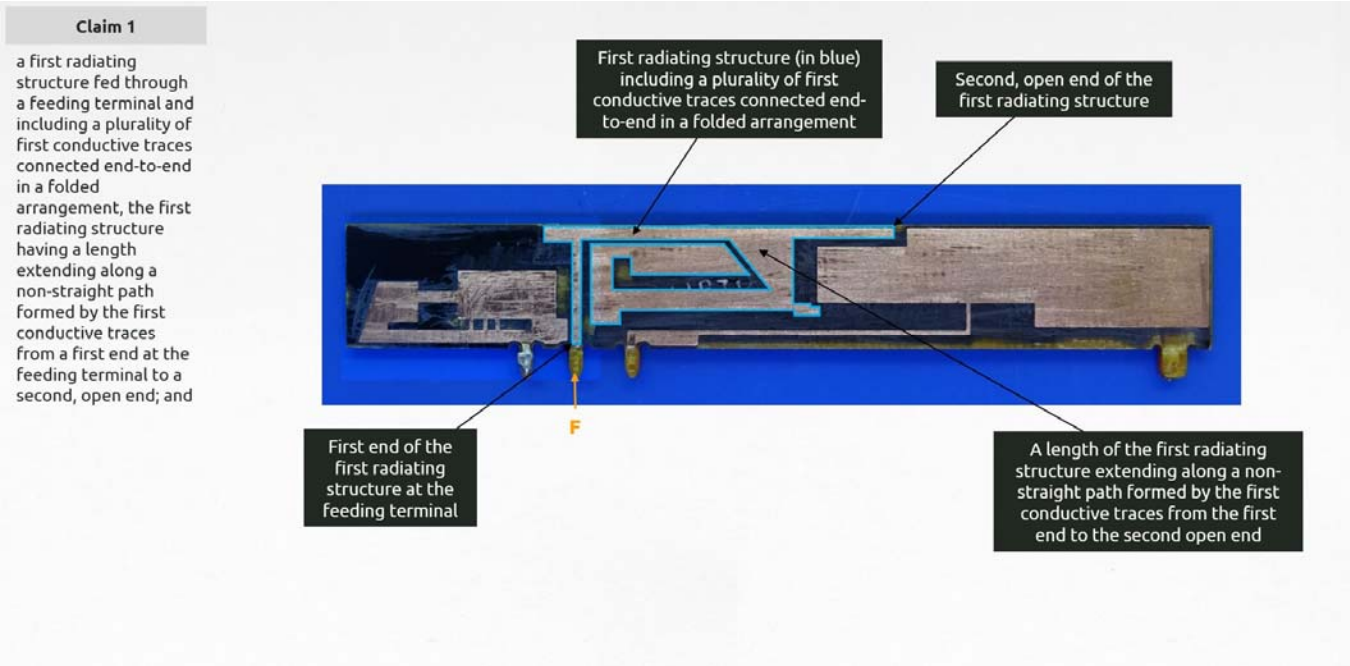
67. For example, the Vivint Smart Hub Panel satisfies all claim limitations of at least claim 1 of the '770 Patent.

a. The Panel is an apparatus with an interior antenna having multi-band behavior along with a ground plane.

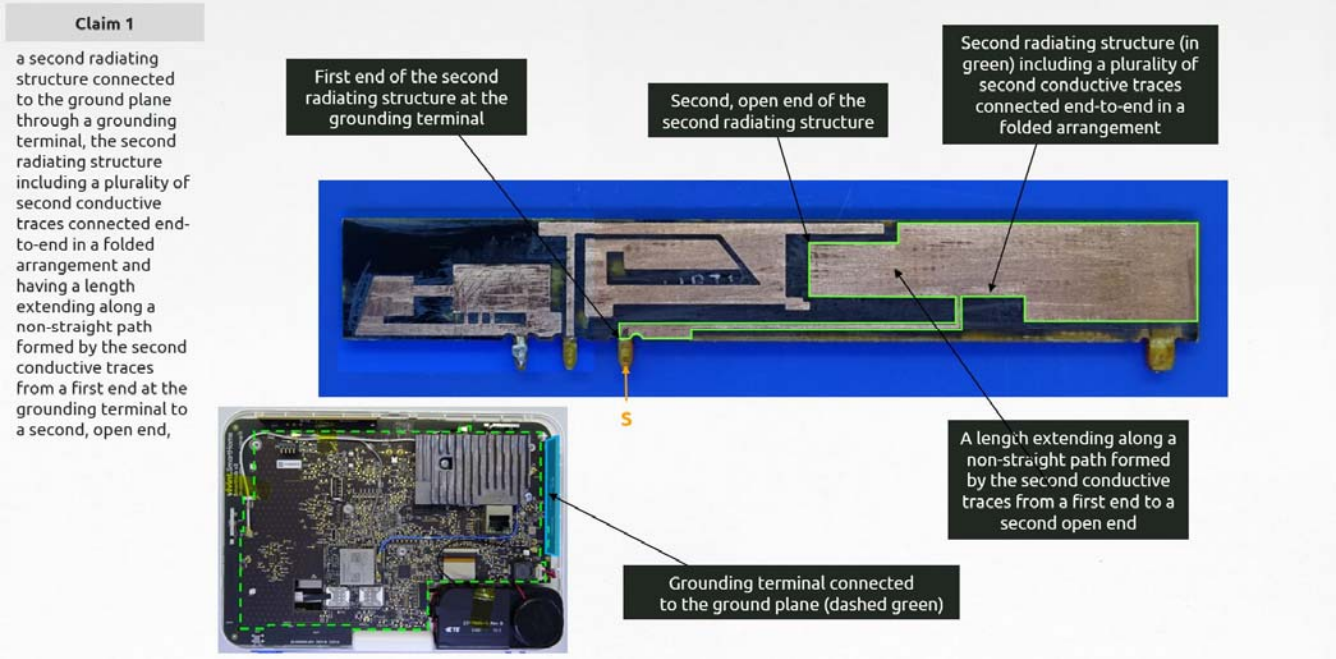


[6] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the '770 Patent.

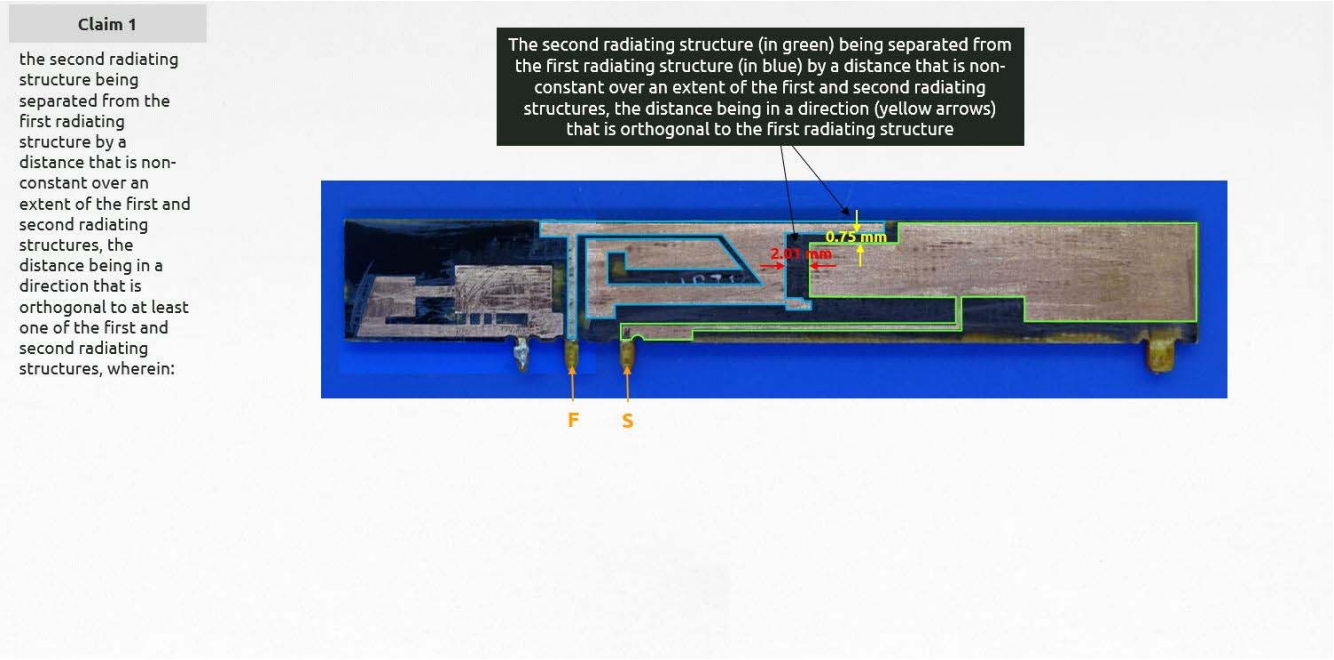
b. The antenna possesses a first radiating structure fed through a feeding terminal with conductive traces connected in a folded arrangement. The first radiating structure extends along a non-straight path by conductive traces from the feeding terminal to a second open end with a width varying and perpendicular to the non-straight path.



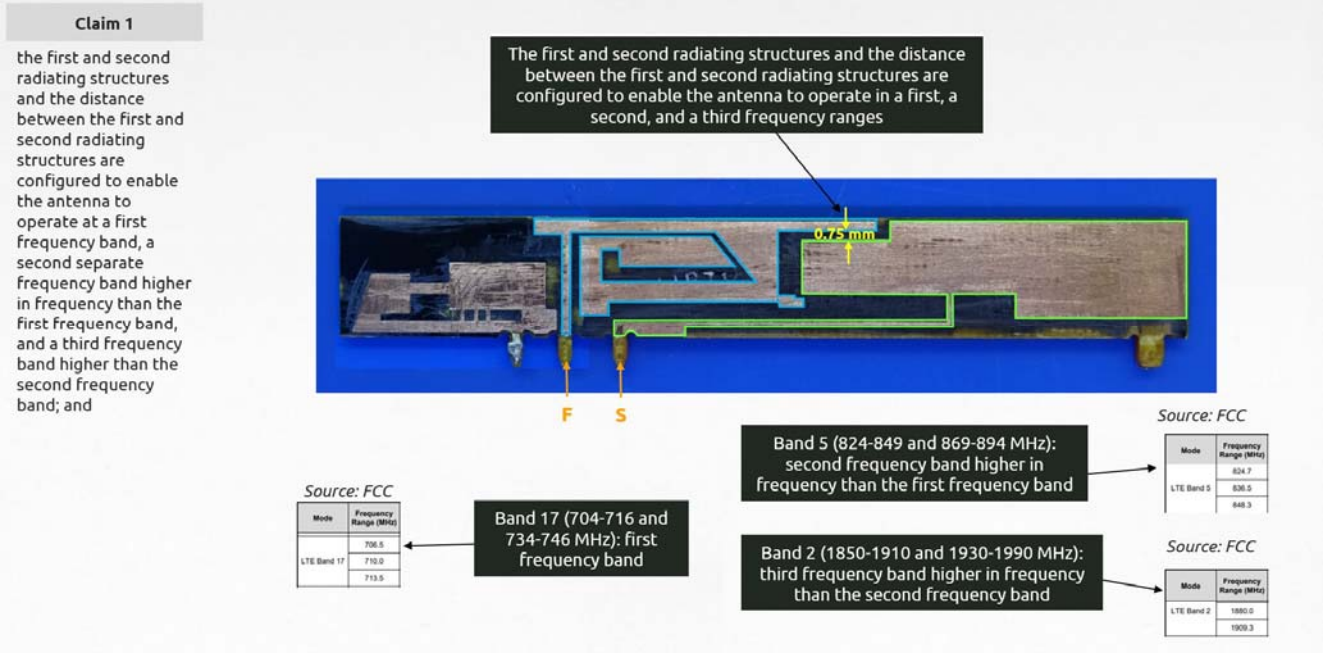
c. The second radiating structure is connected to the ground plane through the ground terminal and possess the relevant arrangement of conductive traces.



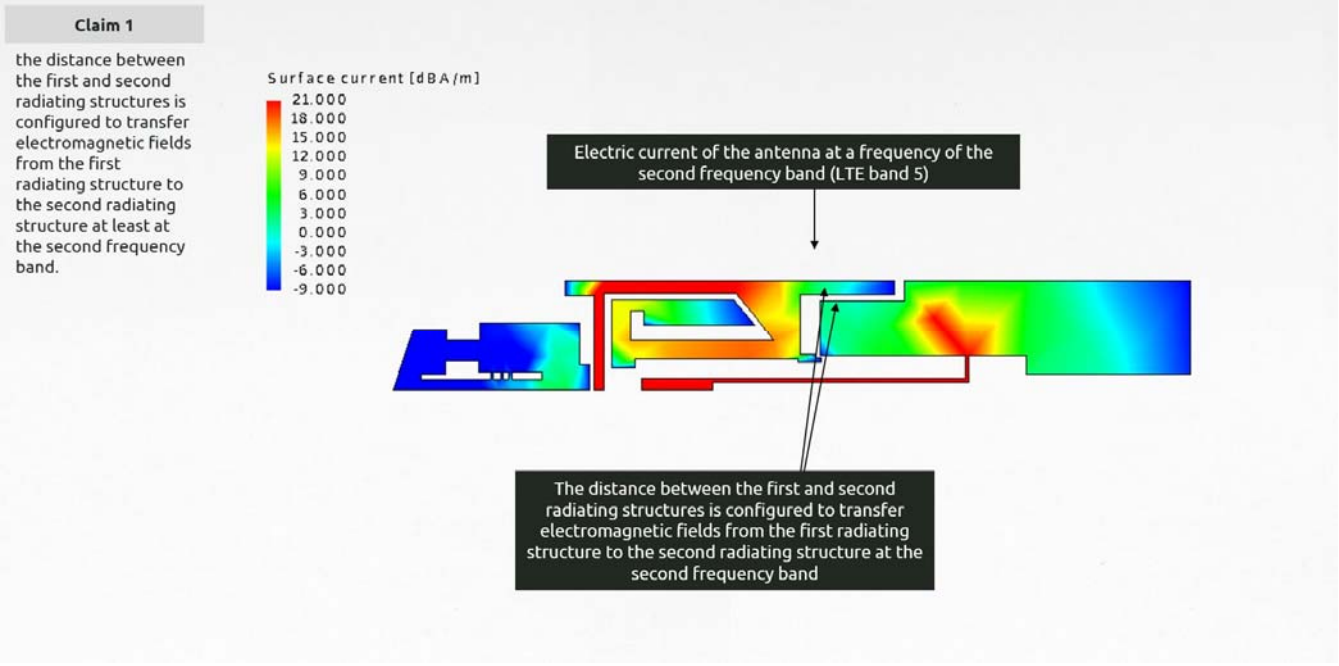
d. The second radiating structure is separated from the first radiating structure by a distance which is non-constant and orthogonal to at least one of the two radiating structures.



e. The distance between the two radiating structures is configured to enable the antenna to operate at the three relevant frequency bands.



f. The distance between the two structures is configured to transfer electromagnetic fields from the first radiating structure to the second structure at the relevant frequency band.



68. Defendant has knowledge of the '770 Patent and has also indirectly infringed at least

claim 1of the '770 Patent by active inducement under 35 U.S.C. § 271(b). Defendant has induced, caused, urged, encouraged, aided and abetted their direct and indirect customers to make, use, sell, offer for sale and/or import Infringing Products. Defendant has done so by acts including but not limited to selling Infringing Products to their customer; marketing Infringing Products; and providing instructions, technical support, and direct links to vendor websites (available via, e.g., https://shop.vivint.com/?ca=981748 [https://perma.cc/9RT7-BTNU?type=image] (last accessed 10/10/2022)) for the use of Infringing Products. Such conduct by Defendant was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

69. The acts of infringement by Defendant have caused damage to Fractus, and Fractus is entitled to recover from Defendant the damages sustained by Fractus as a result of Defendant's wrongful acts in an amount subject to proof at trial.

PRAYER FOR RELIEF

WHEREFORE, Fractus prays for judgment against Vivint as follows:

70. A judgment in favor of Fractus that Vivint has infringed and are infringing either literally and/or under the doctrine of equivalents, the Patents-in-Suit;

71. An Order permanently enjoining Vivint, their respective officers, agents, employees, and those acting in privity with them, from further direct and/or indirect infringement of the unexpired Patents-in-Suit;

72. An award of damages to Fractus arising out of (1) Vivint's past infringement of the Patents-in-Suit, (2) Vivint's on-going infringement of the unexpired Patents-in-Suit, and (3) enhanced damages pursuant to 35 U.S.C. § 284, together with prejudgment and post-judgment interest, in an amount according to proof;

73. An award of attorneys' fees pursuant to 35 U.S.C. § 285 or as otherwise permitted by law; and

74. Granting Fractus its costs and further relief as the Court may deem just and proper.

DEMAND FOR JURY TRIAL

75. Pursuant to Federal Rule of Civil Procedure 38(b), Fractus hereby demands a trial by jury on all issues triable by jury.

Dated: October 31, 2022

Respectfully submitted,

By: */s/ Max L. Tribble by permission Claire Henry*

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